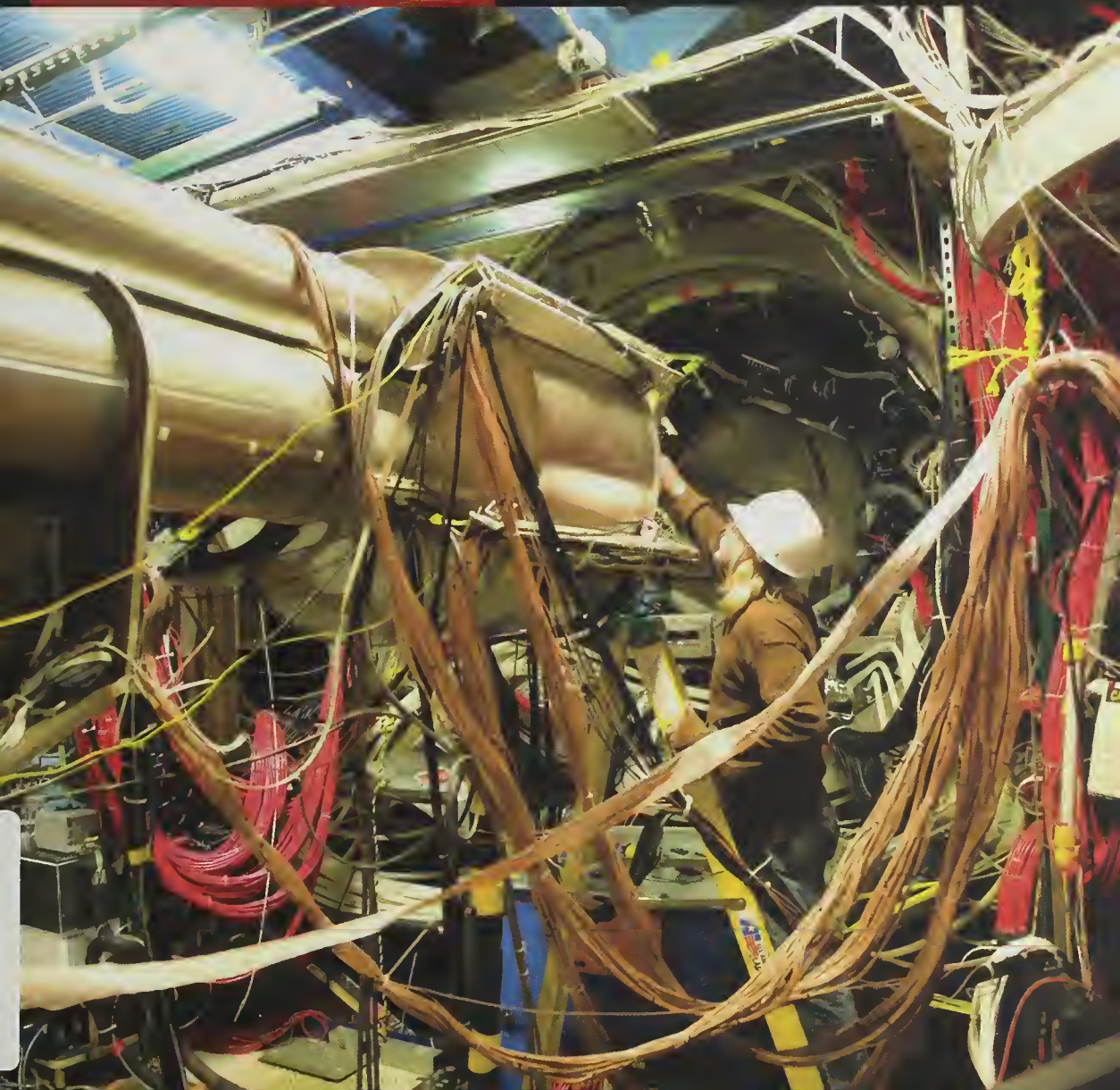



Making the Most of Mess

Reliability and
Policy in Today's
Management
Challenges

EMERY ROE





Digitized by the Internet Archive
in 2020 with funding from
Duke University Libraries

MAKING THE MOST OF MESS

Making the Most of Mess

Reliability and
Policy in Today's
Management
Challenges

EMERY ROE

DUKE UNIVERSITY PRESS

DURHAM AND LONDON

2013

© 2013 DUKE UNIVERSITY PRESS

All rights reserved

Printed in the United States of America

on acid-free paper ☹

Designed by C. H. Westmoreland

Typeset in Chaparral Pro with Univers display

by Keystone Typesetting, Inc.

Library of Congress Cataloging-in-Publication

Data appear on the last printed page of this book.

To

LOUISE PALMER FORTMANN

and in memory of

PAT CRECINE *and* AARON WILDVASKY,

who were in at the beginning

CONTENTS

Acknowledgments ix

ONE. Introducing Policy Messes,
Management, and Their Managers 1

TWO. When Reliability Is Mess
Management 16

THREE. The Wider Framework for
Managing Mess Reliably: Hubs, Skills,
and the Domain of Competence 32

FOUR. Bad Mess Management 56

FIVE. Good Mess Management 78

SIX. Societal Challenges 106

SEVEN. Professional Challenges 128

EIGHT. How We Know That the Policy Mess
Is Managed Better 144

Notes 155

Bibliography 175

Index 201

ACKNOWLEDGMENTS

In 1970, a PhD candidate submitted his dissertation to the Economics Department at the University of Houston. The thesis, “The Measurement of the Timing of the Economic Impact of Defense Procurement Activity: An Analysis of the Vietnam Buildup,” set out how defense contractors and procurement policies of the U.S. Department of Defense worked to undermine economic stability:

It is the purpose of this dissertation to demonstrate that sufficiently accurate information about the timing of the impact on economic output of defense procurement activity did not exist during the Vietnam buildup. As a result, national stabilization policies were inadequately restrictive to compensate for the increases in defense production and, hence, contributed to the unstable economic conditions of the late 1960's. The model which is developed in this dissertation would have provided more accurate information about the timing of this impact and would have improved national stabilization policies. (1970, 2-3)

Unfortunately, models that show how to improve economic stability through better information can be flipped into a road map to create more instability and market power by withholding that information. This economist was Ken Lay, later head of Enron.

If economic theory tells us that monopoly power, asymmetric information, public goods, and negative externalities reflect market failure, what more do we need to know by way of a starting point if we want markets to fail our way? Their mess is our profit. Yes, those novel financial models and instruments that Enron pioneered led to its collapse. But matters didn't stop there. The same innovations resurfaced as major causes of the 2008 financial meltdown, as if Enron had not happened. We will see that the very same innovations are involved as well in some of the more dangerous messes we are in today. “It's not the tragedies that kill us,” the American wit Dorothy Parker insisted, “it's the messes” (quoted in Miller 2004).

But that's not quite right, is it? Not all messes are bad, be they in our personal or our professional lives. Even in policy, some messes are good from the start. There are some that can be managed for the better, and it is clear that others are made much worse from mis-

management. This book is about how to manage messes in policy more reliably and avoid managing them less reliably. Nothing induces mess quite like Theory on its own, but small-*c* concepts and small-*a* approaches for mess management, I hope to show, have their practical uses.

A book about mess risks becoming a mess. My book turned into a decade-long project, during which it felt as if I talked to a small town of people at conferences, workshops, panels, seminars, courses, classes, and more gemütliche occasions. To each person, I am grateful. If I have succeeded in keeping this work on point, it is through the good offices of Anitra Grisales, Evert Lindquist, Lloyd Linford, Paul 't Hart, and the reviewers. Arjen Boin wrestled to the mat several of the book's incarnations, not always winning but always scoring points. I am grateful to Valerie Millholland, Gisela Fosado, Jeanne Ferris, Eileen Quam, and Christine Dahlin with Duke University Press. My special thanks go to my friend and research colleague Paul R. Schulman. Only when I started working with Paul did I realize I had a book in the making. He witnessed its evolution and references throughout signify my debt to him. None of these individuals are responsible for any errors that remain. Finally, I'd like to express my gratitude to those presses, publishers, and journals that gave me the opportunity to publish initial versions of material that have been substantially reworked here: Oxford University Press (van Eeten and Roe 2002), CRC Press/Taylor and Francis (Roe 2007), Stanford University Press (Roe and Schulman 2008), and the Policy Studies Organization/Wiley (Roe 2009). Professional policy analysts, myself included, would be hobbled in long-term projects if we didn't have these early opportunities to formulate positions that later on mutate along different lines of argument.

ONE

INTRODUCING POLICY MESSES, MANAGEMENT, AND THEIR MANAGERS

My first and most important point: Policymakers in government and policy analysts in the public and private sectors have a great deal to learn about management from a special class of professionals little discussed in the literature or media: namely, those control room operators who manage large technical systems for water supplies, electricity, telecommunications, and other critical infrastructures that societies have come to depend on for reliable health, safety, and energy services.

This book is about applying what has been learned from managing more reliably in one domain (critical infrastructures) to the broader domains of policy and management that have their own political or legal mandates to be reliable, yet increasingly fall short of meeting those mandates.

When we think of policymakers, as we often must these days, we may have in mind leaders, legislators, and officials who govern our political institutions. When many of us think of control rooms and the operators in large-scale energy or telecommunications systems—if we think of them at all—it is during major emergencies. Among the better-known examples are the frantic actions of control room operators at the Fukushima nuclear power plant, on the Deepwater Horizon drilling rig, or in the lower Manhattan telecommunications hub as the World Trade Center fell around it on 9/11.

Why should we expect that policymakers, analysts, and political elites have anything to learn from real-time infrastructure managers? Because these operators manage every day to prevent all manner of major accidents and failures from happening, which would occur if the operators had not managed the way they do. We see politicians, policymakers, and their support staff operating at their performance edges; what we don't see is that critical infrastructure managers have to do the same every day, but more successfully, by managing the way they do.

My second line of argument: What exactly is this “managing the way they do”? To answer succinctly, control room operators are often brilliant mess managers, and what is blazingly obvious is we need better

mess managers when it comes to what seem to be intractable problems in policies and politics.

When asked why I call these apparent intractabilities “messes,” my answer is that this is precisely what they are called by those responsible for managing them. There is no metaphor or argument by analogy here. The healthcare mess, Social Security mess, financial mess, euro-zone mess—those are the terms used by the public, analysts, and elites to sum up the issues and tasks before them. What is less recognized—and the book’s aim is to fill this gap—is that the same messes can be managed more reliably and professionally than the public or the policy establishment acknowledge.

The image that the public may have of control rooms—men and women undertaking command and control in darkened venues, sitting in front of computer screens and with grid maps on the walls—captures none of the daily, if not minute-by-minute, adaptations required of operators to meet all kinds of contingencies that arise unexpectedly or uncontrollably and that have to be dealt with if the critical service is to be provided reliably. I argue that these skills and this perspective offer a more realistic template for success than do current policy analytical and decisionmaking approaches, many of which I show are faith-based in the extreme.

My third line of argument: Just look at the sheer number of different policy messes for which we need more realistic managers! After I describe what control room operators do in managing the variety of bad and good messes that come their way, I spend most of the book showing how those in and around the policy establishment can be their own networks of mess and reliability managers. As networks of professionals, I argue, they are better able to avoid bad or worse messes, take more advantage of the good messes there are, and more effectively address the societal and professional challenges ahead in managing policy messes more reliably.

For some readers these arguments are crystal-clear and in no need of elaboration before moving directly to the next chapters. Most readers will require a fuller description of why and how the points matter, as I intend the readership to be drawn from many fields and concerns. My examples are drawn from the United States and internationally; they include policy messes in the arenas of the environment, education, climate change, social welfare, health, and international development. I focus in all chapters on one connecting policy mess that enables me to illustrate the major points in my argument as I develop them. This is the global financial mess that came to the fore in 2008 and afterward. I

describe and follow that mess as it has morphed into the multiple muddles over unfunded pensions, underfunded Social Security and medical obligations, sovereign debt, banking reform, and currency stability in the eurozone and elsewhere. I turn now to an expanded discussion of my three lines of argument.

This Argument in More Detail

Now step back and consider the world around you. It's a mess, and we know it. But if almost everything is a mess, is each mess being managed for the mess that it is? It is one thing to say that messes start out bad; it is something else to say that they are bad because we manage them poorly. A little bit of both is happening, you say. But that "little" matters considerably when capitalizing on the role of mess in policy, management, and politics. Good messes are to be had, and we can manage a major mess well rather than poorly.

For the moment, think of a policy mess as a public issue so uncertain, complex, interrupted, and disputed that it can't be avoided. It has to be managed; the problem is how. The ideal aim would be to prevent the mess, or clear it up once and for all, but that is easier to say than do. Yet every day, professionals reliably manage to produce critical services, including water, electricity, and even financial services. They do this not by getting rid of messes as much as by continuously sorting them out, especially when those services are needed most. How do these professionals do that, and what can they tell us about how to better manage messes or avoid the truly bad ones in our society? This book illustrates important lessons for those who need to be mess managers in policy, management, and the political economy we find ourselves in. My argument is that those in health, social welfare, development, business, and the environment, among other arenas, should become much more like those professionals.

The approach in this book builds on my work with Paul Schulman on reliability professionals. In *High Reliability Management: Operating on the Edge* (2008), we undertook a case study and detailed key concepts in the way control room operators and managers keep large technical systems reliable under highly volatile situations, when options are sometimes few, and success is never guaranteed. This book recasts those professionals and their networks as exemplary mess managers and extends the original framework into the wider reconsideration of political economies not just in the United States but abroad as well. My

earlier book, *Narrative Policy Analysis* (Roe 1994; see also Roe 2007), showed how the disputed stories that drive much of public policy and management could be better analyzed. But stories have their beginning, middle, and end, and the nub of a policy mess is that those in the midst of it do not know how their policy and management efforts will or could end.¹ After a point, decisionmakers may even wonder how the mess began or evolved. In contrast, mess managers are very good at answering the question “What happens next?” We will see how the unique narratives of mess managers play a major role in management and policy.

Much of this should not be new. It is a truth universally acknowledged that each generation discovers on its own just how complex and uncertain their surroundings are. As the nineteenth-century essayist Thomas De Quincey put it in his *Logic of Political Economy*, “upon what is known in Economy there is perpetual uncertainty, and for any inroads into what is yet unknown; perpetual insecurity” (1849, 35). For a contemporary example, the debt levels of U.S. states are so substantial, according to Felix Rohatyn, an expert in this area, that he can’t “see where the end of this is” (quoted in M. Cooper and Walsh 2010). Professionals who find themselves in such a tide race of affairs and are searching for what happens next should read this book.

Specifically, policy analysts, managers, businesspeople, and public administrators will find the approach helpful in understanding what makes for the successful managing of policy messes in the sectors in which they operate. Business schools and programs as well as providers of health and social services should find much of use here. The approach also offers insights and instruction to a wider audience, including economists interested in the institutional design of governance structures; engineers committed to better design and risk analysis of large technical systems; organization theorists analyzing technological accidents and organizational reliability; social scientists studying major technology transformations; and planners for the long term who confront demands for better management in their arenas.

Some messes, to repeat, start out and stay bad; they may be beyond the grasp of management. Others are managed poorly or effectively, and it is essential to determine which is the case and what the results are. The following pages parse and explain good and bad messes; more important, they describe good and bad mess management. Many examples are discussed along the way, not just the 2008 financial meltdown and its repercussions. For the latter, I rely to a considerable extent on contemporaneous reports from the press and elsewhere to

give a flavor of the immediacy of grappling with events in real time. We have been told that “the public finances of most advanced countries are in a greater mess than at any point in peacetime history” (Plender 2010b). If so, how do those managing it measure up against professionals who see to it that the messes they face are managed, not cleared away?

Were messes no different than problems, we could rely on conventional policy analysis and management to get out of them. No such luck. As I show in the first chapters, a policy mess involves changeable individual actions and local contexts confronting unstable principles and policies. Principles and policies, moreover, diverge significantly from the fast-moving trends and patterns they are meant to address. Yet all this slipping and sliding takes place under mandates to manage a critical good or service reliably—that is, safely and continuously—through time, no matter what rude surprise crops up. All this occurs in systems that are not just technical or organizational, but in the same instant rooted deep in political economy and culture. You can see why some call this constellation a potent source of “wicked” policy problems, in which cause and effect are tangled together and next to impossible to sort out.²

Mess has never been far away in my own profession of policy analysis and public management, which is full of wicked policy problems, muddling through, incrementalism, groping along, suboptimization, bounded rationality, garbage can processes, second-best solutions, mixed scanning, policy fiascos, relentless paradoxes, fatal remedies, rotten compromises, managing the unexpected, coping agencies, normal accidents, crisis management, groupthink, adhocracy, and that deep wellspring of miserabilism, implementation. As these notions circle around the same prey, this book takes a closer look at the animal itself: the policy and management messes we find ourselves in, especially when it comes to important services like water, energy, transportation, telecommunications, health, finance, development, and the environment. In focusing on policy messes and their management, I do not critique conventional analysis and management as much as rethink my profession from a different direction. As I go along, I signal my debt to those who have thought through these issues ahead of me.

It’s easier to belittle messes than avoid them, and the first thing good mess managers show us is that *we manage messes we can’t avoid, we don’t “clean them up.”* Many people believe or insist that the way to clear up policy messes is by reducing uncertainty, simplifying complexity, resolving conflict, and completing unfinished business. A fair num-

ber of decisionmakers seem to think: This mess needs cleaning up, and since God isn't doing it—nor, for that matter, is anyone else—it's up to me to do the job. Such assumptions are why there are so many intractable muddles in policy and management.

What should they do instead? *We can learn from those professionals whose job it is to manage mess all the time.* There is nothing novel about the need for learning. What is new is shifting the focus to identifying, studying, and learning from a unique group of mess managers who are reliable in terms of the outputs and outcomes of their management. For them, managing well rather than managing poorly means they manage messes reliably or reliability messily: They manage the needful under always-dynamic circumstances. From them we learn that *mess management requires three skills: pattern recognition, scenario formulation, and the ability to translate pattern and scenario into a reliable service, now when it matters.* These professional managers do not achieve reliability directly by designing broad systems to govern all discrete operations. To be reliable, they and the networks in which they operate interpret what system patterns mean for the locally specific scenarios they face now and in the next step ahead. Why the need for translation? Because designs—be they policies, principles, or laws—have to be modified both in light of local features and in light of the broader patterns that emerge across a run of individual operations. Both have to be accounted for in order to achieve reliable services. This sorting-out process of recognizing systemwide patterns, formulating local scenarios, and modifying scenarios in light of those patterns is complicated, but it is the core of good mess management and what this book is dedicated to detailing. Put directly, this book aims to renovate the good name of mess.

To start with, it is important to understand the respective concepts of mess and reliability, which I introduce in the remainder of this chapter and discuss more fully in chapter 2. Chapter 3 identifies and describes those professionals who are officially charged with providing services reliably, but who unofficially have to do so by continually managing the messes that arise in that provision. By the end of chapter 3, the reader will have the framework to determine and evaluate what makes a mess and its management good or bad when it comes to the reliable provision of a service. The first step in making the most of policy and management messes is to minimize bad ones, and chapter 4 presents examples of bad messes and poor mess management in policy. Chapter 5, the longest in the book, devotes considerable attention to what makes for good and even better mess management. These chapters illustrate how to be good mess managers, protect such man-

agers, avoid bad messes, and manage more reliably all those other messes in policy, management, and politics that have yet to go bad or are otherwise primed to go from bad to worse.

Chapters 6 and 7 focus on the challenges—first societal and then professional—that we face in managing policy messes. At the societal level, complexity, conflict, uncertainty, and unfinished business can make for a clumsy minuet: The more mess there is, the more reliability decisionmakers want; but the more reliable we try to be, the more mess is produced. The more decisionmakers try to design their way out of a policy mess, the messier actual policy implementation gets; but the messier the operations are at the micro level, the more decisionmakers feel solutions are needed at the macro level. This does not augur well for the future, and indeed that future is the source of much of the mess we are now in. What we end up with is politics of fewer options and much turbulence within which mess managers must be reliable. In this way, the societal challenges in chapter 6 become the professional challenges in chapter 7. Professionals have to learn to better manage those politics by building up their analytic and management capacity via networks of like professionals, by capitalizing on better practices that have been developed across diverse communities and situations for like issues, by managing complexity much better than they have hitherto, and by operating more effectively in real time. Chapter 8 brings us full circle by addressing what the preceding chapters mean for managing the morphing financial mess we continue to be in as well as other major policy messes.

At no point in this book do I argue that the only way to get out of our policy messes is to create far better human beings, incentives, policies, laws, or politics than we currently have. All this may be required, but if that is true, so is the fact that such insistence frequently makes for more messes. This book focuses instead on what professionals and their existing better practices imply for policy messes, financial or otherwise.

To get to chapter 8's conclusion, we must begin the journey by understanding just what mess is and what makes for all this talk about "good" and "bad" messes. As we will see, these distinctions come back to those who are managing the policy messes and how are they doing it.

Mess: Good and Bad

"Mess" and "bad" almost always go together when it comes to policy, management, and politics. For that matter, mess is mentioned every-

where—except in the indexes of our textbooks on public policy, economics, and management.³ Messes are considered bad, if only because they are difficult to sort out—or, more subtly, if they require a different sort of management, one that many decisionmakers find less than straightforward.

Almost everyone who experienced the financial meltdown in 2008 thought of it as bad. It evolved out of a “mortgage mess,” morphed into a “credit mess,” and became a comprehensive “economic–employment–government debt–current account deficit mess,” also unprecedented in recent history (see, for example, Blinder 2007; Calomiris and Wallison 2008; *Economist* 2009b). For those in its midst, it has proved difficult to see any good coming from it, apart from the usual attempts to make the best of a bad situation.

Bad messes are taken to be many, frequent, and long-lived, while good messes—if they are recognized—are considered ephemeral, sporadic, and certainly not to be relied on. Moreover, when it comes to messes, it’s reliability that counts. Policy analysts, public managers, and businesspeople are expected to clear major messes up by making affairs more reliable. Reliability is controllability, or at least predictability and stability. More mess is a sign of more unreliability, so more reliability should mean less mess. What saves this from being a thoroughgoing tautology is the fact that there are conditions under which mess can be managed so as to increase the options for reliability, even if it leaves things messy—though more manageable.

Just what is a mess in policy and management? For starters, issues are a mess not only when they are complex, but also when they are uncertain, incomplete, and disputed. They are uncertain when causal processes are unclear or not easily comprehended. They are complex when more numerous, varied, and interdependent than before. Issues are incomplete when efforts to address them are left interrupted, unfinished, or partially fulfilled. Issues are disputed when individuals take different positions on them because of their uncertainty, complexity, and incompleteness. A policy mess is an amalgam of these contingencies that has become so accident-prone along its multiple dimensions that it has to be managed.⁴ In less formal terms, a mess is what can happen when “different parts of the system contribute to different decisions in different ways at different times” (March 1966, 66–67)—which, not unimportantly, also describes the exercise of power. For me, mess and its management go together very differently than problems and their solutions do, as the rest of the book demonstrates.

Several features follow from this definition of a policy mess when it

comes to the challenge of managing for reliable services. First, it is next to impossible to measure mess. In particular, we still have no good empirical measure of interdependence (see LaPorte 1975). Reliability, however, is measurable (for example, your ATM is highly reliable because it has never been out of order when you needed to use it). Second, those who are mandated by law, regulation, or their mission to provide what society considers critical services want complete knowledge of cause and effect in their systems, especially when it comes to identifying the factors that are essential for reliability. These people avoid, wherever possible, working in what engineers call “unstudied conditions.” Lack of complete causal knowledge, however, is at the core of messy policy when societal conditions are changing all the time. Third, when has the human condition ever been “completely studied” in terms of its mess and reliability? Consider these long-standing caveats: “Things of this World are in so constant a Flux, that nothing remains long in the same State” (John Locke, philosopher); “All human institutions and none more than government, are in continual fluctuation” (David Hume, essayist, economist, and historian); “All countries are and always have been in a state of transition, and it is the character and purpose of human nature that all societies should be constantly altering” (Lord Palmerston, nineteenth-century prime minister of Great Britain). Fourth, and not surprisingly in the midst of all the flux, most people end up having to tolerate messes (in this book, mess means specific messes). Rather than putting up with what they dislike, they would much rather have their messes prevented, and reliably so, especially when circumstances are so mutable.

So where does that leave those who take mess and reliability seriously? Difficult-to-measure interdependence but with measurable declines in reliability; working in unstudied conditions but mandated to have reliable services; constantly having to tolerate change but always insisting on more stability along the way—no wonder many see risk on all fronts. All these and more were found in the financial mess of 2008 and its ongoing incarnations. How so?

“Risk is now driven by the increasingly tight coupling of markets and the resulting complexity and interdependence,” a financial derivatives specialist told us early on (Das 2007). Starting with risk as the likelihood and consequence of failure, then spreading that risk in a financially interconnected world had four disastrous consequences for finance and beyond, as we shall see in greater detail. First, it concealed risk; second, it increased risk; third, it concentrated risk; and fourth, it had people talking about “risk” in situations where they could not even calculate

the probability or consequences of failure. While derivatives have been long used in other sectors, such as commodities (Raeburn 2009; see also, for example, Grant, Milne, and van Duyn 2009), financial derivatives and other innovative instruments hid risk while spreading it, thereby increasing uncertainty and unpredictability. Here is how one new financial instrument, the collateralized debt obligation (CDO), is described as playing its part in the financial mess:

The system works only if the securities in the CDO are uncorrelated—that is, if they are unlikely to go bad all at once. Corporate bonds, for example, tend to have low correlation because the companies that issue them operate in different industries, which typically don’t get into trouble simultaneously. . . . Mortgage securities, by contrast, have turned out to be very similar to one another. They’re all linked to thousands of loans across the U.S. Anything big enough to trigger defaults on a large portion of those loans—like falling prices across the country—is likely to affect the bonds in a CDO as well. (Mollenkamp and Ng 2007; see also Davies and Ishmael 2008)

Instead of diversifying risk, major investment houses, banks, and others ended up acting in convergent ways. Either “too many funds bought the same assets” (Zuckerman and Strasburg 2009) or the “problem was that, while these assets are heterogeneous, the owners were not. In tough times they behaved the same way. . . . Diversification was therefore fake” (Lex Column 2008a).⁵ Perhaps more troubling, efficient market mechanisms like auctions could not work because of the sheer complexity of the financial instruments to be auctioned.⁶ Secretary of the U.S. Treasury Timothy Geithner summed the situation up succinctly: “As the [financial] system grew in size and complexity, it became more interconnected and vulnerable to contagion when trouble occurred” (2009).

For John Kay, a *Financial Times* columnist, the “financial innovation that was once the means of spreading risk is now an unmanageable source of instability” (2008). What were often intended to be tax- or regulation-avoiding financial instruments (see, for example, Houlder 2009) ended up as innovations—such as credit default swaps—that “turned into a monster . . . [and] came close to destroying the entire financial system,” thereby playing a principal role in that “financial mess,” according to Burton Malkiel, a professor of economics at Princeton University (2008). Writing about himself in the third person, a Goldman Sachs vice president who was the subject of a lawsuit said he was “standing in the middle of all these complex, highly leveraged, exotic trades he created without necessarily understanding all the im-

plications of those monstrosities [sic]!!!” (quoted in Rappeport 2010). While alarms were raised about these weapons of mass destruction (as Warren Buffett famously called them), many mainstream economists thought otherwise, thereby adding to the uncertainty. “I am surprised Warren Buffet [sic] is so unenlightened,” said Robert Shiller, a professor of economics at Yale University, adding, “he is such a smart guy. Derivatives are just another form of risk management” (2003, 124).⁷

If a mess such as this has to be taken as bad, are there good messes to be managed out of any of it? By the time you read this, the financial upheaval of 2008 and onward will have joined with and transformed itself into all manner of other policy messes to be managed. We may well have returned to the novel financial instruments that got us into trouble in 2008 (Bullock, Demos, and Nasiripour 2012; Plender 2011a) and, before that, with Enron. We will be muddling through to some new “normal” in the midst of a sovereign credit crisis here, the pension overhang there, or debt and defaults wherever. Whether or not we will be managing the messes that ensue for countries, counties, cities, or corporations is altogether a different issue.

The irony in all this is that “mess” started out good. The first “policy-maker’s” mess was the officers’ mess. The term “mess” initially meant a portion of food, “a mess of pottage.” Later on the term came to denote partaking of meals together and, when at sea, the actual location where these meals took place—the mess decks (Dickinson 1973). Even today, good messes are to be found by those in search of them. When told that Britain’s renegotiation of European Union membership would end in a muddle, Harold Wilson, then prime minister, responded: “I am at my best in a messy middle-of-the-road muddle” (quoted in Harding 2006).⁸ The *Harvard Business Review* assures businesspeople that “messiness isn’t all bad” (2003, 96), and an article in the same publication is titled “When Organization Messiness Works” (R. Freeland 2002). Eric Abrahamson and David Freedman’s *A Perfect Mess* (2006) serves up the same idea in its subtitle: *The Hidden Benefits of Disorder—How Crammed Closets, Cluttered Offices, and On-the-Fly Planning Make the World a Better Place*.⁹ Current research methods in the social sciences are, in turn, criticized for not taking mess seriously (Law 2004). As we will see later, mess takes center stage in the work of Russell Ackoff, the late professor emeritus in the Wharton School and a popular management and business expert.¹⁰

While good messes have been little studied in the policy analysis and public management literature, other disciplines have been more forthcoming. “All psychoanalyses are about mess and meaning, and the

links between them,” according to Adam Phillips (2001, 59), a psychoanalyst and essayist:

What is a good mess? Which might mean from whose point of view is it good (or bad) and what are the unconscious criteria for deciding? In one mood I might think despairingly, “This room is too cluttered”; in a different mood I might take it for granted, find it rather cozy, be impressed by being the kind of person who lives in creative chaos, and so on. In other words, what makes clutter work for us, and how does it work when it does? A good life, one might say, involves making the messes you need. (67–68)

The good mess, Phillips argues, is the mess that can be used (71). A rise in the ruble or fall in the price of oil creates messes that are good for some but not for others. “One investor’s disclosure clutter is another investor’s golden nugget,” argues an informed observer about the debate on regulatory requirements (Jones 2012). Less overtly, the good mess can benefit only after being “stumbled upon” or found by asking: What is hidden, as it were, *by plain sight* that could be used? So too in “clutter you may not be able to find what you are looking for, but you may find something else instead while you are looking for it. Clutter may not be about the way we hide things from ourselves but the way we make ourselves look for things” (Phillips 2001, 64). How we use clutter depends on how we sort it out. When it is a rainforest, it is a mess we can use (for example, it could hold the cure for cancer); when it is a jungle, it is a bad mess of no good use (according to Kurtz’s “the horror, the horror,” in Joseph Conrad’s *Heart of Darkness*). Abrahamson and Freedman’s *A Perfect Mess* provides examples of when disorder leads to innovation or discovery.

If a good mess is a mess that can be used, then how can we use it? It depends on that word “use,” doesn’t it? Some of this is making the best of a bad situation. Researchers took advantage of the August 2003 North American power-grid blackout to evaluate and recalibrate models of the effects of power-plant emissions on smog and haze in the region and beyond (Marufu et al. 2004). Threats of network hacking sometimes bring forward upgrades that had been planned anyway (Sengupta 2012). Some of this is managing to look on the bright side: Atmospheric cooling was noticeable after all planes were grounded on 9/11 (Robbins 2007), while air pollution diminished significantly in Russia during the 1990s because of that nation’s economic decline (Cherp, Kopteva, and Mnatsakanian 2003; Revkin 2006). Chinese air pollution, one headline tells us, led to more snowfall in California’s Sierra Nevada mountain range (Upton 2012). The financial mess and

economic recession after 2008 led to an unprecedented fall in greenhouse gas emissions, according to a study by the International Energy Agency (Harvey 2009b). It may be that one environmental mess, the ozone hole, has protected Antarctica from an even worse mess, that being further melting induced by global climate change (Harvey 2009a).

Sometimes, however, the issue is one of pulling a good mess out from one that could go bad. One salutary, albeit unintended, effect of the Y2K retrofitting was the advanced contingency planning for information-technology management developed in response to the feared millennium bug (Valentine 2005). In the follow-up to legislation mandating “living wills” for major financial institutions that outlined how they would sell off major divisions should the need arise, one bank fortunately “discovered that it had only one global Microsoft Office licence, so its various divisions would be unable to communicate if the parent entity went down” (Masters 2011). When credit froze at the start of the financial mess, institutions such as the European Investment Bank and the World Bank were able to borrow money by issuing bonds at record-low interest rates; as one article noted, “the public sector has become one of the few beneficiaries of the financial crunch as a flight to quality has enabled these top-grade triple-A rated issuers to carry on regardless in the business of raising capital” (Oakley 2008). As the last example illustrates, good messes can as well go bad later on, unless they are managed reliably. I return later to this notion of “pulling out a good mess,” but here I only note that a good mess is not just “a matter of perception.” It is a matter of the actual behavior of professionals as mess managers, even if they realize the existence of the mess at the last minute or for a short time only.

Mess Managers, Not Crisis Management

Studies underscore the role of a unique cadre of professionals in managing critical services reliably (Roe and Schulman 2008). Staying with finance and banking for the moment, these professionals are the managers, operators, and support staff whose supervision, networks (formal and informal), and skills (measurable or not) ensure that financial services do not fail as often as they otherwise would in an interconnected financial sector. These are the people preventing the technical and system accidents or failures waiting to happen, albeit sometimes just under the wire, with close calls and near misses. The net present value of averting these failures is in the billions of dollars. These networks in-

clude engineers, IT specialists, front-line operators, and middle-level managers of control rooms, operation centers, and trading floors—and not just in the banking and finance sector, but in those electricity and telecommunications infrastructures without which financial services would not be reliable in real time. The professionals may include the chief financial officer, regulatory staffer, legislative analyst, supervisor or inspector, auditor, and others who ensure the safe and continuous provision of the critical service under severe time pressures. I describe these professionals in the subsequent chapters and identify the limitations of such professionalism when I focus on professional challenges in chapter 7.

There are no guarantees of persistent or universal success when it comes to this cadre of professionals. As the financial crisis demonstrates, mess can morph into crisis, and even the best mess managers can and do fail. “Could you just imagine the mess we would have had?” pressed Secretary of the U.S. Treasury Henry Paulson in defending the March 2008 bailout of the major investment firm Bear Stearns before the 2010 Financial Crisis Inquiry Commission (FCIC). “If Bear had gone there were hundreds, maybe thousands of counterparties that all would have grabbed their collateral, would have started trying to sell their collateral, drove down prices, create even bigger losses. There was huge fear about the investment banking model at that time” (FCIC 2011, 291).

For our purposes, a crisis is having to cope in the manager’s no-go area beyond known patterns and scenarios. Let’s call that area “unstudied conditions.” “The truth is that no one in business has lived through a financial crisis such as this,” the *Financial Times* reported in 2008, “so top executives and their advisers have no experience to draw on in evaluating the prospects” (Willman 2008). That said, this book is not about coping better with policy crises (for those interested in crisis management, see Boin et al. 2005). It is about how to manage so that a mess doesn’t become a crisis. As the chairwoman of the Federal Deposit Insurance Corporation said, “We don’t want to be glamorous; we want to be safe and reliable” (Bair 2009). While I have a great deal to say about how to manage the policy messes leading up to and following from a crisis, I hope to convince you that many messes, even some bad ones, can be managed differently than full-blown crises. In the same way that climate change, healthcare, and overpopulation are said to be crises, significant features of these issues continue to be policy messes that can be managed better for increased reliability.

If there is one major “crisis” examined in this book, it is that mess

management is being eroded by societal challenges when it need not and should not be. Let's now turn to a fuller explanation and description of the key terms "mess" and "reliability" and the ways in which they have become so knotted together that they can no longer be untied.

TWO

WHEN RELIABILITY IS MESS MANAGEMENT

From initial media reports you would think that it was the *unreliability* of mortgage holders and lenders, computer models and trading, rating agencies and investors, along with banks, bailouts, and our animal spirits, that accounted for the financial mess. But that argument was quickly turned on its head: The real culprit was reliability.

“Financial stability itself creates confidence and risk-taking, eventually leading to recklessness and instability,” declared the *Economist* (Carr 2009, 8, 10).¹ Bubbles, conceded Alan Greenspan, the former head of the Federal Reserve, require all those “low long-term interest rates, low inflation and macroeconomic stability,” which we had been told up to that point were a Good Thing (quoted in Guha 2008a; see also Goodhart and Persaud 2008).² According to a leading *Financial Times* economist, Martin Wolf: “A long period of rapid growth, low inflation, low interest rates and macroeconomic stability bred complacency and increased willingness to take risk. Stability led to instability” (2008a).³ Another economist, Robert Samuelson, concluded: “People were conditioned by a quarter-century of good economic times to believe that we had moved into a new era of reliable economic growth” (2011, 16). In short, boom leads to bust; good leads to bad; and the more stable the financial system, the greater the incentive for others who rely on it to take more and greater risks.

The stakes are high in getting this issue right. For example, a great deal of attention was paid to the moral hazard involved in bailing out risk-taking banks and investors. The fear is that bailouts and handouts serve only to whet the appetite for risk. The stability-leads-to-instability argument suggests a more urgent moral hazard, however: Every day that mess managers reliably provide critical services under increasing budget and staff constraints is one more day that executives, politicians, and other leaders feel they can bet the company by taking riskier Big Experiments. Even journalists saw this. Writing about the financial mess, Christopher Caldwell underscored the point: “The longer the [credit and finance] system went on without collapsing, the more incentive there was to strip protective ‘give’ out of the system” (2008a).

In order to make sense of mess and its management, we must have a sharper appreciation of reliability's role in all of this. To do that means we have to have a better definition of "reliability" than a stability that is both the cause of and antidote to instability. In chapter 1, I initially defined "reliability" as predictability or controllability of a service that society considers vital. Let us begin, then, with the professionals who aspire to meet critical service requirements safely and continuously, even during peak demand and turbulent times. The critical services can be in the form of financial services, electricity, telecommunications, and water; in the same way, managers and operators outside society's critical infrastructures insist that they too provide critical services, as for social and health services. Reliability means the lights stay on, even when some generators do not, and the ATM works, even when electricity does not. When the lights go out or ATMs fail, the subsequent effects across interconnected personal and professional systems can be dramatic. Mess metastasizes.

In what sense can we speak of mess that arises because these systems are operated reliably? One conventional answer has it that we are a risk society, where the policy muddles to be sorted out today—air pollution, traffic congestion, financial instability, the junkspace of modernity generally—are those created in the process of trying to produce reliable goods and services (Beck 1999; Bowe 2005; Offer 2006). The resulting messes call for further management and further reliability. What stops this from being a treadmill is that, as we shall see, more and more reliability seems to be directed toward keeping bad messes from happening, while making better use of the good ones that come along. Increasingly, reliability is a form of mess management, not of mess production.

Different Modes of Reliability as Mess Management

To better understand the concept of reliability as mess management, let's see how control operators and managers of major critical infrastructures handle all the surprises and glitches that come by way of having to meet legal and regulatory reliability mandates, all the time and whatever the conditions. Again, reliability here means providing a critical service safely and continuously, even during turbulent circumstances.

A little background is helpful. Reliable infrastructures today differ strikingly from those of earlier periods (LaPorte 1996; Rochlin 1993;

Schulman 1993). In the past, large technical systems were often housed in and controlled by an overarching organization, such as those integrated public utilities that generated, transmitted, and distributed electricity or water. With deregulation, liberalization, and privatization, networks of different organizations are now mandated to provide reliable telecommunication, electricity, and financial services (de Bruijne and van Eeten 2007). Waterworks become comanaged not just by government water departments but now by agencies mandated to protect habitats and species (van Eeten and Roe 2002). Earlier theorizing argued that networks of organizations, some of which have competing or conflicting goals (think of Enron during the 2001 California electricity crisis), should find it more difficult to ensure highly reliable service provision (Roe and Schulman 2008). Parallel developments in social and human services under pressure to outsource have been subject to the same forces. Elements that were once unified under one organization by law for the provision of a vital service have been decoupled by law, only to be recoupled through networks of private and public organizations. That this “management for reliability” now looks and is messy should be no surprise.

Here is what more recent research has to say about such management (first presented in Roe and Schulman 2008).⁴ Imagine a large technical system that faces a wide task environment of varying volatility, while the available responses to that volatility also vary. Volatility is the extent to which system managers and operators confront uncontrollable or unpredictable conditions that threaten their ability to provide the critical service. Some periods are of low volatility: There are no surprising or unscheduled interruptions in the electricity supply, water provision, or financial services. Other periods are ones of high volatility: Temperatures go up, causing increased difficulties to the providers of electricity, water, or health services. In some cases, volatility is high because what no one expected to happen actually does—for example, the Icelandic banking system collapses in a matter of days. Volatility, in other words, refers to the persisting or emerging instabilities in the task environment that confront the network or networks of managers, including system operators. In this chapter, when I speak of “managers,” I primarily mean both large-infrastructure control room managers as well as real-time financial services providers—including face-to-screen traders and brokers—along with their immediate specialist staff. Later chapters extend the analysis to managers of related and other policy messes.

The managers we are talking about here have different resources in

terms of money, personnel, and strategies with which to address the volatility they face. This is called “option variety.” High option variety means that an electric grid or investment firm has more resources available than the regulators require; low option variety means fewer resources are on hand to meet requirements. The systems we are talking about also operate under reliability mandates. They may be de jure, as in the case of a bank’s regulated capital reserve requirements, or de facto, as when a transmission operator informally keeps a higher reserve of electricity than regulation mandates. Such reliability requirements can derive from system technology and/or organizational features. Supply and demand on the electricity grid (roughly, load and generation) must be balanced to equal each other in real time, or the grid could eventually collapse. Reliability efforts in regard to natural gas transmission focus on avoiding having to shut off the flow of gas completely because it can take days to reactivate the flow, building by building. The hospital emergency room, the highway during rush hours, and the bank’s set of ATMs are reliable only if they ensure safe and continuous critical services when it matters—namely, when the service is needed, often “always right now.” As for the financial services sector, too-safe-to-fail triple-A ratings proved to be highly unreliable when such a rating mattered the most during the panic at the end of 2008.

The two dimensions of task environment volatility (high and low) and options variety (high and low) set conditions for four performance modes that operators and managers work within as reliable service providers. The argument is that reliability in critical service provision (I am now thinking of critical services generally) requires access to all the performance modes, with each mode being its own form of mess management. To be clear, the performance modes are not diamond-sharp categories (that would be too much to expect of the messes of interest here). When reliability requires shifts across performance modes, the distinction between messes demanding to be sorted out and mess management as a demanding way to sort messes blurs into much the same thing (more on this point below). While specific terms for the performance modes vary, for ease of reference I build on the terminology of our electricity research: “just-in-case,” “just-on-time,” “just-for-now,” and “just-this-way” performance. Each is briefly described and then elaborated on as I discuss their features in terms of mess management.

“Just-in-case” performance. When options are high and volatility low, many different options, resources, and strategies exist “just in case”

they are needed.⁵ Reserves are large, excess capacity exists, and ample backups or fallbacks are available, all with little unpredictability or uncontrollability. This seems to be the ideal state of affairs in which to be (for the manager, not the economist), but it is not without its own risk. Operators and managers can grow complacent and end up not paying attention to changes in system volatility and/or options availability. Compared to the other modes, however, managing against complacency is a good mess to be in.

“Just-on-time” performance. When options and volatility are both high, just-on-time performance moves center stage. What worked today or yesterday may not work under very similar conditions tomorrow. A specific resource that was available just before could well not be available right now, and the manager has to be creative on the fly with the other options that remain. This performance condition requires real-time flexibility—that is, the ability to quickly make use of options, resources, and strategies in order to meet the reliability requirements for safe and continuous service provision. Flexibility in real time means operators and managers are so focused in the moment on meeting a reliability requirement that they customize the match between the high volatility they face and the responses available. The match is just enough, just when needed. For example, a supply chain may be flexible (or “resilient”) because multiple vendors in a chain are ready to fill in when one falls short with little notice (Sheffi 2005). (This is why just-on-time performance is not to be confused with just-in-time manufacturing: The latter can be just-plain-late when it actively discourages such flexibility.)

Note that the same system interconnectivity that poses problems also can make new options and resources available. The major risk in just-on-time performance that combines creativity and discretion in how to sort out and assemble different options is misjudgment under the pressures of time and having too many balls in the air. Just-on-time performance means pulling a good mess out of ones that could go bad even in an instant.⁶

“Just-for-now” performance. Using up resources can draw down the options available with which to respond, now and at the next steps ahead. When option variety is low but volatility remains high, just-for-now performance comes into play. “Just keep that valve open for now!” “Just stay late, that’s all I’m asking!” “You’ve got to dial up the pressure from this point on . . .” Just-for-now is the most unstable performance mode, and it is the one that operators and managers want to avoid most or exit from as soon as practicable. Why? Because they could well

back themselves into a corner by trying to be reliable. In this mode, options and volatility are linked, and being reliable now can make reliability all the more difficult to achieve later on. For example, operators and managers might have to go outside official channels or formal procedures to keep things reliable: “Keep that generator online, just for now!” Yet keeping equipment online when maintenance is overdue or insisting that already fatigued workers keep working longer can end up making things worse—which poses a major risk when there are few other options. What would otherwise be marginal, small adjustments can, if prolonged indefinitely, become deviations from the norm that amplify hazards rather than reduce them. Keeping something or someone working for just one hour more under these conditions may crash the system, even when one more hour would be nothing to worry about most other times.

From the standpoint of reliability, this performance mode cannot continue indefinitely. Operators and managers know they are not in complete control here; they know they are resorting to firefighting, band-aids, and quick fixes. They understand how vulnerable the system is, how limited and interdependent options are, and they are busily engaged in trying to develop or secure resources to move out of this state. Just-for-now performance is such a bad mess that, if protracted, it could become the worst imaginable—the system could fail entirely.

“Just-this-way” performance. When the only option left is to reduce volatility directly, just-this-way performance moves front and center. One-way-only command and controls are asserted. A banking holiday is declared, mandatory job furloughs instituted, water conservation measures imposed, and shedding load is enforced through scheduled blackouts. The great risk is that not everyone who needs to comply will comply, when following orders is the only way to ensure reliability. Just-this-way performance is stopping an already bad mess from worsening into a full-fledged crisis.

We are now positioned to summarize the four performance modes as they translate into different forms of mess and mess management. The bad mess is having to manage under just-for-now conditions (high volatility with few options), for if firefighting and temporary fixes don’t work, then major failure needn’t be that far away. Good messes exist with just-in-case or just-on-time performance (high options whatever the volatility), though managing in either of these ways is not without its own hazards. If there is a good mess in just-this-way management (reducing volatility through command and control), it is

stopping the bad from becoming worse. As for the best mess, staying reliable in the face of all the risks means being able to maneuver across performance modes as conditions change with respect to volatility and options. Looked at from the other side, the worst mess is one in which it is not possible to work within any mode, let alone maneuver across them as conditions change. When that occurs you are coping, not managing, in unstudied conditions. The quickest way to go from a bad to worse mess is by extending “until further notice” just-for-now performance, eventually leading to the only “option” left when even emergency declarations and the like simply don’t work: failure and crisis.

The following chapters describe the flesh and bones of these good, bad, worst, and best messes along with their management. What is important to reiterate is that both moving across performance modes and working within any one of them involve risk. Professionals, even at their best, face likely hazards in managing different messes in order to stay reliable in their service provision. These operational risks—complacency, misjudgment, deviance amplification, and noncompliance—are multiple and, as we just saw, vary by conditions and resources. This means that when managers are unable to work within and across the performance modes, risk appraisal on their part ends up becoming very difficult indeed, if not actually impossible. Unable to assess risk and differentiate which risks demand attention, no one can manage the messes for reliability because they are now in unmanageable conditions. This difficulty is nowhere better illustrated than with the 2008 financial meltdown.

Limits of Management in the Financial Mess

The financial meltdown has been attributed to a failure in risk management by banks, investment firms, rating agencies, and regulators, most prominently. One proposal has been to separate risk management from actual banking and investment operations and to elevate the former in importance. “Risk and control functions need to be completely independent from the business units,” recommended Lloyd Blankfein, the head of Goldman Sachs, “and clarity as to whom risk and control managers report to is crucial to maintaining that independence” (2009). But consider the following carefully: How is risk to be separated from operations, as if performance modes could be divorced from their respective risks and messes? True, chief risk officers and their units were marginalized or co-opted by senior banking and investment executives leading

up to the financial mess (FCIC 2011). Granted, one may want to empower risk officers or the enterprise unit to oversee the additional risk imposed by having to manage through different performance modes in order to maintain reliable financial services. But it is quite another matter to assert that it is more useful to have the management of respective risks separated from real-time operations. When not only is the devil in the details but only a devil could know the details, then that can make for the worst mess possible.

It is important to underscore the fact that good as well as bad messes have been witnessed throughout the financial mess—even in events leading up to and after 2008. Just-in-case management is what banks tried to do by increasing their capital reserves through bailout funds without, however, passing those funds on through increased lending; they held onto cash just in case things got worse. That was a good mess to be in from their viewpoint, but the way they managed their mess was part of the bad mess we borrowers found ourselves in at the same time.

Just-on-time management surfaced when liquidity was readily accessible when needed most. Liquidity in finance is the ability of a seller to assemble a deal when times get tough, which in our terms is the ability to assemble options, even if only at the last moment.⁷ Just-on-time liquidity is illustrated in the demise of the \$6 billion hedge fund, Amaranth, in 2006, a collapse foreshadowing worse things to come. As Gillian Tett of the *Financial Times* described it then: “In recent years hedge funds have proliferated, creating a vast pool of investors willing to take risk, and thus act as buyers of the last resort when a crisis strikes. . . . Amaranth illustrates the point. No sooner had it admitted to its losses, than buyers offered to purchase its gas portfolio (averting the prospect of dumping them on the open market)” (2006b). This was a good mess for Amaranth, in contrast to the 2008 bankruptcies that followed.

Just-this-way management in the form of command-and-control measures characterized a significant element of the meltdown. Those special government entities that were central to the U.S. mortgage market, Fannie Mae and Freddie Mac, ended up nationalized. The U.K. government took over management of Northern Rock to stop a bank run. Direct command and control were asserted to ensure that mortgage rates and other lending became less mercurial—all in the name of securing greater authority over reducing volatility directly.⁸ An article in the *Financial Times* noted: “Tensions in money markets are so high we have witnessed the extraordinary spectacle of central banks not

only *providing* liquidity but in effect *becoming* the market” (P. Davies 2008).

All of which leads to that most unstable performance mode, that bad mess of just-for-now. The blowup of those novel, securitized financial instruments meant all manner of just-for-now relaxing of rules, special dispensations, emergency exemptions, and one-time events like the FDIC’s “systemic risk exemption” (on the latter, see Guha et al. 2008). For instance, in March 2008 the Federal Reserve arranged a last-ditch bailout for the nation’s fifth-largest investment bank, Bear Stearns, because the latter risked bankruptcy. How the bailout was managed is illuminating:

In an action almost unprecedented in takeover history, JPMorgan bought 39.5 percent of Bear on the spot to ensure that it would have close to a majority of the votes to approve the deal. That agreement completely disregards New York Stock Exchange’s rules that prevent anyone from buying more than 20 percent of [the] company without a shareholder vote. Other parts of the new agreement either stretch the rules or disregard years of precedent in Delaware, where both banks are incorporated. Of course, all of this rule-bending was done with the tacit, if not outright, approval of the federal government. (Sorkin 2008)

Paul Volcker, the former head of the Federal Reserve, summarized this just-for-now behavior as having taken the Fed to the “very edge of [its] lawful and implied powers” (quoted in Scholtes 2008). Paul Krugman, the Nobel Prize-winning economist, called it “barely legal” (2008a).⁹ Many other just-for-now transactions in banking occurred before the end of 2008, ranging from temporary lines of credit (Chan and McGinty 2010) to just-for-now circuit breakers and kill switches intended to “temporarily” interrupt market prices from falling below set limits.

Being the most unstable performance mode, management under just-for-now conditions bears close scrutiny. In earlier critical infrastructure research (Roe and Schulman 2008), operators and managers told of their great dissatisfaction in having to work under such conditions. In some cases, it meant they had to commit an official violation in order to avoid an even graver error. Worse yet, prolonging such just-for-now performance is a sure way to deprofessionalize operators and managers. You could even define prolonged just-for-now activities as the inability of professionals to come up with better operating practices. When continually resorting to firefighting, quick fixes, and band-aids because they perceive no other alternative, professionals degrade their expertise, and their skills atrophy. This kind of “panic engineering,”

even when necessary, is not something to be prolonged (see Sengupta 2012). What does that mean practically? In one of many examples, Henry Paulson clearly went into his job as Secretary of the Treasury with his professionalism recognized; how that professionalism survived the prolonged 2008 financial meltdown will be a continuing matter of much historical contention, even among Paulson's admirers (FCIC 2011; Sorkin 2009).

Nor is the problem solely one of how endless firefighting can erode the competence of a Treasury secretary or a central bank head. An equally worrisome issue has to be that options and volatility are fully interdependent in just-for-now messes. For example, serious reservations were expressed over loosening restrictions with respect to fair-value accounting during the financial upheaval (Norris 2009). Assets, it was argued, should instead be priced by their owners at what they were forecast or modeled to be, which would be higher than fire-sale prices of distressed sales. Doing so did improve the balance sheets of some who owned these otherwise illiquid assets. In this way, resources and options increased—but, sadly, so did worries over the possible adverse effects on volatility. The gap between these now-imputed prices and what potential buyers really thought the assets were worth could prove to be even greater than imagined before the loosening of restrictions. That would make things even messier (see, for example, Hughes 2009).

These distinctions between modes of mess and mess management matter for two other reasons. First, proposed improvements all too often fall short of producing reliable financial services when effects of those proposals on options and volatility are not made explicit. Adding liquidity in a volatile financial environment means that the system can at best be managed just-on-time rather than just-for-now; in other words, increasing financial liquidity may add options but do little to reduce financial volatility. For instance, a central bank window for emergency lending or a Treasury line of credit may be better at increasing options through added liquidity than at reducing financial volatility. Increasing capital reserve requirements or putting limits on leverage—the ratio of borrowings to equity—may, on the other hand, have everything to do with stabilizing financial volatility without necessarily adding more options for financial managers. A government plan for bank recapitalization to allay public fears over widespread bank insolvency may, in contrast, have just as much to do with reducing system volatility as increasing those banks' options. So clearinghouses for over-the-counter derivatives may also have the virtue of addressing simultaneously the reduction of volatility and the increase in options,

at least to the degree that the clearinghouses are not themselves so interconnected as to increase risks (Dudley 2012; it was even difficult to get detailed counterparty data after 2007 [Tett 2009c]).¹⁰

The differentiated nature of risks is the second reason why the performance modes matter when it comes to managing the financial mess better. We've seen how varying system volatility and options with which to respond to unpredictability or uncontrollability pose different risks of misjudgment, complacency, compliance, and backing oneself into a corner for managers. But these risks together point to two general ones directly related to options and volatility. When there is (1) a permanent reduction in the variety of options for responding to changing task volatility and/or (2) a permanent increase in task volatility that cannot be responded to by a variety of options (whether because of misjudgment, complacency, or whatever), the risk of producing bad messes increases dramatically. That is why the permanent loss of capital in the face of doggedly unstable situations has been one of the most important risks emerging from and evident in the financial mess (see Plender 2011b). Or to put the point the other way round, when implemented proposals actually increase options and/or reduce volatility as just discussed, managing the mess becomes far easier.

Let's stop there for the moment and shift the discussion from good messes that can become bad and bad messes that can get worse to what were the best and the worst messes in the financial meltdown. We've sketched good and bad mess management in terms of specific performance modes, but what about the best financial mess to be in (that is, being able to operate across all performance modes as needed) versus the worst mess to be in (that is, being compelled to operate in unstudied conditions entirely outside known performance modes)?

So far, the worst mess in the financial crisis—and here “crisis” is the correct term—was the panic recorded in the last quarter or so of 2008, when it was in no way evident just who was going to be saved and who would be left to fail. “It feels as if we are 15 minutes away from the end of the world,” the head of equities at a large U.K. bank told the *Financial Times* at that time (quoted in *Financial Times* 2008). “The market has changed more in the past 10 days than it had in the previous 70 years,” reported a senior executive at a European investment bank (quoted in Thal Larsen and Guerrera 2008). “The reality is that we are not going to know what the right price is for years,” said a bond portfolio manager at a major mutual fund (quoted in Bajaj 2008). “It was just mayhem,” said the CEO of a New York-based hedge fund about the markets (quoted in Mollenkamp et al. 2008). “People were paralyzed by

fear of what could erupt.” “We have no idea of the details of our derivative exposures,” conceded a senior official at Lehman Brothers at a meeting of bankers and regulators just before that firm collapsed, “and neither do you” (quoted in Guerrera and Bullock 2008, 16). Just after the Lehman collapse, the chairman of the Federal Reserve was asked, “Well, what if we don’t do anything?” “There’ll be no economy on Monday,” Ben Bernanke replied (quoted in Wolf 2009).

After the plunge in Morgan Stanley shares, a senior manager at the Swiss bank UBS said: “It felt like there was no ground underneath your feet. I didn’t know where it was going to end” (quoted in Sorkin et al. 2008). Nor was he alone. To the global investor George Soros, it felt as if “the financial crisis [was] spinning out of control” (2008, 11). The chair of Morgan Stanley Asia concluded: “We have gone to the edge of an abyss that few thought was ever possible” (Roach 2008, 26). Other citations could be added, but the point remains: The people in the midst of the financial turmoil at that moment—the traders, bankers, and investors—were operating outside of known performance modes and in a region of pervasive unknown unknowns. It turns out that these financial managers hadn’t been managing reliably after all, or else they wouldn’t have ended up where they did, in free fall. If things were this awful, how then can we speak of the best mess to have at the same time?

That Other Mess . . .

The best mess was a very big dog that didn’t bark in the financial upheaval. In circumstances uniformly described as bad to awful, the financial meltdown was accompanied by a silence that went largely unreported. Simply put, while banking and finance are a global infrastructure, the financial mess—even when it morphed into a crisis—did not spread to other critical infrastructures as rapidly and pervasively as it did through the real economy.

The effect on the real economy has been much noted. In the words of the Financial Crisis Inquiry Commission: “Distress in one area of the financial markets led to failures in other areas by way of interconnections and vulnerabilities that bankers, government officials, and others had missed or dismissed” (2011, 27). True, but then why didn’t it spread further into other critical infrastructures? After all, critical infrastructures are said to be highly connected. “Interconnected systems too complex and dangerous to fail are not unique to financial

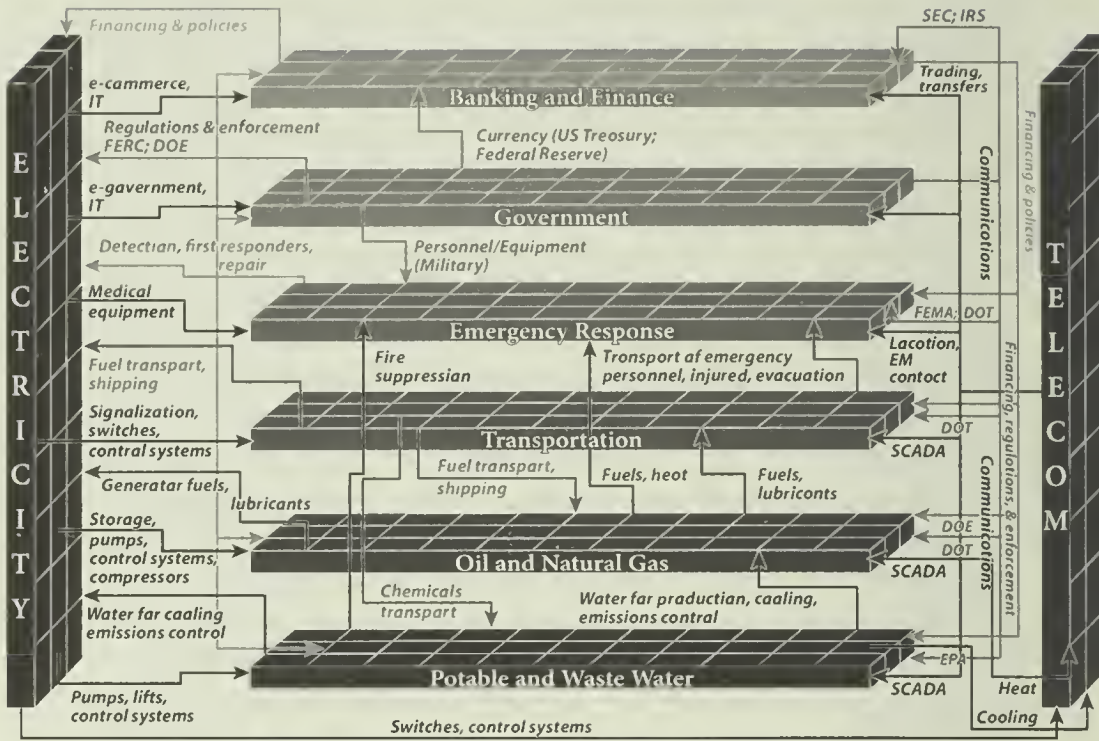


Figure 1. Interdependencies among eight critical infrastructures

Source: Heller 2002

services,” writes the economist John Kay (2009a). “Failure could also have catastrophic consequences in electricity networks, oil refineries and petrochemical plants.” Which is to say we should expect the failures themselves to be potentially interconnected and propagated. Consider the cat’s cradle of interconnected critical infrastructure in figure 1. Other immeasurably more complicated diagrams have been developed since this one (Europeans focus on even more critical infrastructures, as we see below), but figure 1 is sufficient to make the present point.

Consistent with figure 1’s feedback loops across infrastructures, we witnessed some impact of the financial crisis on the sectors of transportation and of oil and natural gas, if only through the freezing up of credit, trade finance, and investment in shipping and public transportation (see Wright 2008, 2009). The financial contagion certainly hampered infrastructural projects in transportation and ports (Little 2009). Associated volatility in markets has as well affected state government revenues (see, for example, Bullock 2011), which in turn affected maintenance and construction budgets and planning for infrastructures. As

the financial mess developed between 2007 and 2008, the Financial Crisis Inquiry Commission found “countless governments, infrastructure projects, and nonprofits on tight budgets were slammed with interest rates of 10% or higher” (2011, 278). Still, figure 1—and again, not only this figure—suggests that a considerable impact of the financial mess should have been felt through the electricity sector, for example, because electricity, like telecommunications, is a critical infrastructure bookending other infrastructures and their sectors depicted in the figure.

Was electricity affected by the financial mess in the similar ways that transportation was? Not if we rely on those same reports about the financial meltdown. While the upheaval clearly affected plans for future infrastructure in electricity (see, for example, Crooks 2008; Wigglesworth, Sakoui, and Kerr 2009), it did not affect real-time operations in any newsworthy way, at least not up to the time of this writing—save for one major possible exception: the massive 2012 electrical blackout in India. That outage was connected to interrelated problems in India’s electricity and banking sectors, though how much those problems were due to the global financial mess as distinct from political issues in India remains an open question (Sender and Crabtree 2012). Reports, however, predict that the “world will witness [a] big demand for investment in energy infrastructure over the coming decades” (Davis 2008). There is also confirmation that other large technical systems, such as railroads, have taken advantage of the post-2008 economic downturn to construct new facilities, as construction companies eager for work come in under budget (Schwartz 2012).

No one doubts that the real economy was hit hard by the financial upheaval, so what is going on here?¹¹ The short answer appears to be that other infrastructures continued to manage, however messily, in the face of the financial turmoil and in ways demonstrably different from what was happening in parts of the banking and finance infrastructure. The only study I know that examines cross-infrastructure cascades has been undertaken by the Dutch research body, TNO Defence, Security and Safety, and the Delft University of Technology (Luijff et al. 2008). As of September 2008, the TNO database covered 2,650 critical infrastructure (CI) disruptions in 164 nations with 1,090 cascading outages. Table 1 records the subset of 1,749 CI failure incidents in 29 European nations, where an incident—when not independent and isolated—could initiate a cascade in the critical infrastructure or result in a cascade in another infrastructure. The majority of incidents are isolated within the infrastructure concerned (1,017 versus 769). The TNO study concludes: “Our analysis of the collected data

Table 1. Categorization of number of CI disruption events

CI sector	Cascade initiating	Cascade resulting	Independent	Total	Sample size
Education	0	3	1	4	4
Energy	146	75	388	609	590
Financial services	1	26	33	60	60
Food	0	4	4	8	8
Government	2	40	26	68	67
Health	1	16	22	39	39
Industry	5	15	7	27	27
Internet	15	51	95	161	160
Postal services	1	0	0	1	1
Telecom	69	125	114	308	295
Transport	19	128	276	423	422
Water	9	18	51	78	76
Total	268	501	1017	1786	1749

Source: Adapted from Luijff et al. 2008

shows that most cascades originate from only a limited number of critical sectors (energy, telecom) and that interdependencies occur far less often than most theoretical studies assume” (Luijff et al. 2008).¹² Note how few cascades are initiated by the financial services sector, compared to the energy and telecom sectors.

In contrast to figure 1 with all its interconnections, but in light of the patterns emerging from TNO’s database, what is striking is how resilient other infrastructures have been in the face of the financial mess, when we would have expected them to have been more vulnerable. Again, circumstances could have changed by the time you read this—the collapse of Lehman Brothers, for example, took a weekend. Even so, nearly all these tightly coupled, complexly interactive connections between and among infrastructures seem to have been managed reliably, at least during the first thirty-six months of the financial mess. Yet bankers and their critics still focus on contagion and the high interconnectivity of banking and finance to the rest of the world (FCIC 2011; Tett, Freeland, and Braithwaite 2010).

Why was there any capacity to be resilient and anticipatory in such a

world? Why exactly was there the ability of operators and technology to absorb a shock or bounce back while working out the next steps ahead? Here we must speculate, as so few have reported on this dog that didn't bark. Research on water and electricity suggests the resilience is due to the ability of their operators and managers to change their management as conditions change. That is, interconnections that appear to be tightly coupled are more loosely coupled than many think—and they are loosely coupled because they were engineered and are managed to be so. “Dependencies” among many infrastructures, write Eric Luijff and his colleagues (2010, 16) in a later and longer review of the TNO data, “are anything but unmanaged.” When true, that is the very best mess to be in for other critical services if parts of the banking and finance infrastructure are rife with contagion. Mess has been always possible given the sheer interconnectivity between and among infrastructures, while the best mess was best because many infrastructures have managed those interconnections in ways to keep many of them latent—so far.

The best and worst messes occurred at the same time during the financial upheaval. If the worst mess when it comes to reliable performance means having to work outside what you know, while the best mess is managing reliably with no more than what you do know, then both were visible in the period up to and after 2008. That leads to a question: If one major reason why this happened was due to the fact that the interconnectivity that brought down much of the securitized finance system was managed differently than the interconnectivity within and between other systems, then just what were those more successful “management skills”?

We turn to these skills next. The typology I've detailed in this chapter is part of a wider framework, which enables us to see what it takes to manage a bad mess so it does not get worse or to pull out a good or even better mess. We have been introduced to types of messes and mess management, but what skills do managers actually have that can help them manage well rather than poorly? What is their domain of competence, and how does it relate to managing messes reliably? We turn now to that wider framework and what it means in practice for different policy messes—including, but not limited to, the financial mess.

THREE

THE WIDER FRAMEWORK FOR MANAGING MESS RELIABLY

Hubs, Skills, and the Domain of Competence

It's rush hour and traffic is its usual mess. As luck would have it, three cars arrive simultaneously at the four-way stop, with traffic backed up behind each. The three cars' turn signals aren't on, but each driver can see the other two clearly. Drivers 1 and 3 are going in the opposite direction, with driver 2 to the right of driver 1 and driver 3 to the right of driver 2 (see figure 2). In the United States, the rules of the road are that the driver on the right proceeds first. On this principle, driver 3 begins to cross the intersection, and in theory driver 2 would go next, followed by driver 1. Driver 2, however, does not go next. Drivers know that in this kind of situation, in rush hour with cars stacking up, it is important to keep the traffic moving. So driver 1 crosses the road just as driver 3 does, and driver 2 goes afterward, none of the three seeing anything untoward in doing so. Of course, the three drivers have to keep alert in case something unexpected happens that requires an immediate reaction on their part.

All the principal features of managing a mess reliably are here. The rules of the road are design principles developed to make traffic flow reliably. Local circumstance can and does require their modification in practice, however. In these cases, reliability depends on the ability of the drivers to recognize then-pertaining patterns and formulate contingency scenarios. Skilled drivers familiar with a situation like the one described know that in these cases, moving across the intersection in the sequence these three drivers did can be quicker than keeping to the rule. In fact, keeping to the rule could make the traffic mess worse.

Even though our drivers may never have been at this intersection before at just this time of day, each formulates a scenario in light of the known patterns and proceeds on that basis. Those in cars farther back would be upset otherwise, as all three drivers are connected with others behind them in the ensuing traffic flow. Sometimes the mess goes from bad to worse regardless. If a driver gets a flat tire while turning

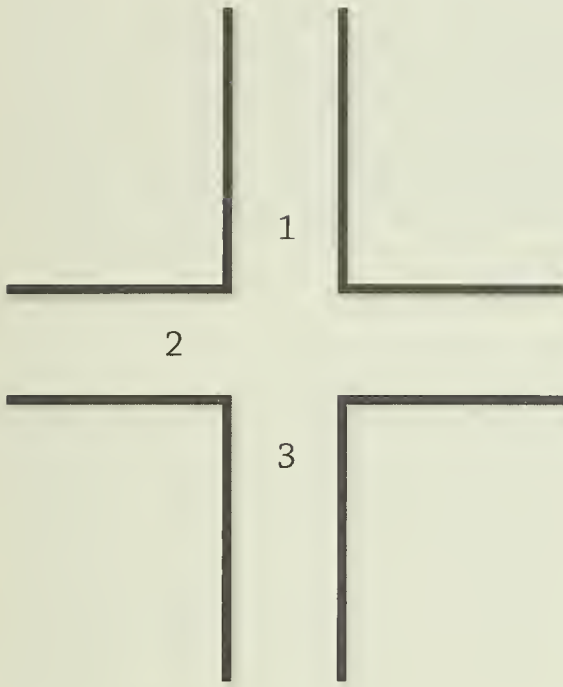


Figure 2. Managing a traffic mess

into the intersection, that may be a scenario none of the drivers present have witnessed before. A first-time driver in this area might get confused. Where no pattern or scenario exists, drivers have to depend on their reaction skills.

The basic elements of macro design, pattern recognition, scenario formulation, and reactive micro operations are roughly captured in this familiar example of managing in rush hour. The analytic framework for connecting these concepts was originally developed by my colleague, Paul Schulman, to understand how electricity control room operators think through their management under pressing time and knowledge constraints. Here and for the rest of the book, I move beyond control room managers and operators by adjusting the framework and its elements to describe reliable mess managers. In formal terms, I argue that these managers should be seen as “mess and reliability professionals” whose special skills, expertise, and competence lie in reliably sorting out the policy and management messes they confront and doing so within the politics they face.¹ I begin by introducing basic concepts and terms, starting again with service reliability, and show how the discussion relates specifically to mess. I apply the extended framework to what many consider the major messes driving economic and social upheavals—namely, overpopulation and globalization. Once the overall framework is presented, chapter 2’s fourfold typology of messes and mess management will be located within it. In

the process, I recast core concepts such as risk and learning, while showing how mess and reliability professionals differ from others. The chapter ends with a fuller definition of a policy mess and their difficulties. I defer discussion of the politics involved to chapter 6. Throughout, I talk about “you,” “we,” and “us” in the belief that we all are better mess managers in the making.

A General Framework

Leave the cars at the intersection and ratchet the analysis up to the system level. The wider organizational literature to which my colleagues and I have been contributing tells us that the drive to highly reliable management in critical infrastructures can be, for heuristic purposes, characterized along two dimensions:² (1) the type of knowledge used in activities to make system services reliable; and (2) the scope or focus of attention for those reliability activities. Reliability management is grounded in knowledge bases that range from experience, based on informal tacit understandings of the activities, to formal or representational knowledge, in which abstract principles and deductive models are also core to understanding activities. Knowledge bases blend induction and deduction in varying ways, which are reflected in the assembly of different arguments and scenarios with respect to reliability.³

The scope of those managing for reliability ranges from a position that assumes reliability is an entire system output, encompassing many variables and elements, to a position that treats each case of reliability as a particular event with its own distinct properties or features. Typically, scope refers to the different scales, ranging from general to specific, that managers must take into account when reliability matters. Knowledge and scope define a cognitive space for managers, where reliability—the continuous and safe provision of the critical service even during turbulent periods and now not just in critical infrastructures—is to be pursued. Things get messy if only because the perspectives of those operating within the space vary in terms of their knowledge bases and scope. As we will see momentarily, things get even messier in the name of reliability.

In this cognitive space, there are four nodal activities (see figure 3), each position being a different mix of perspectives along the two continua. The nodes—I call these positions within the mess and reliability space the principal hubs for thinking about and managing reliably—

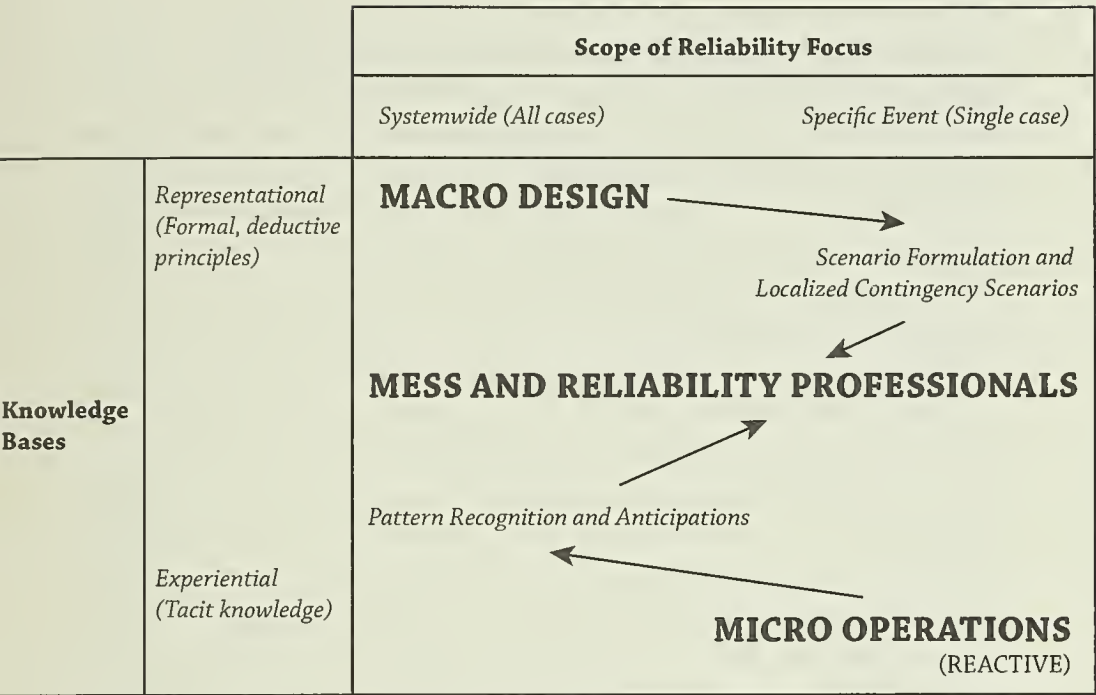


Figure 3. Mess and reliability space of professional activities

are macro design, micro operations, pattern recognition, and scenario formulation. We will see how and why the mess and reliability professional operates in the domain bound by the latter two hubs.

At the extreme of both scope and knowledge, where the scope is the whole system and the knowledge is formal, is the hub of macro design. Design—be it in the form of policy, law, mission statement, or blueprint—asserts that formal deductive principles applied at the system-wide level govern a wide variety of critical processes for service provision. Here design is meant to cover the operation of an entire system, including every single case relevant to providing system services. At the other extreme of the cognitive space is reactive behavior in the face of real-time challenges at the hub called micro operations. Here reliability depends on the immediate activities of system operators using tacit knowledge to manage a particular event rather than relying on preexisting designs at the system level for any eventuality. The field activities of crisis managers and emergency responders are micro operations par excellence.

Designers, however, cannot anticipate every eventuality. Worse, the more “complete” a logic of design principles aspires to be, the more

likely it is that its full set contains two or more principles that contradict each other—for example, we must not commit genocide . . . except when authorized to do so by the nuclear doctrine of mutually assured destruction.⁴ On the other side, operator reactions are likely to give the operator too specific or partial a picture, causing him or her to lose sight of the forest for the burning trees in the foreground. Micro operations, in other words, instill in us a kind of trained incapacity that undermines reliability because operators are not aware of the wider context(s) of their activities.

What to do then, when high reliability is at stake? Moving across the cognitive space from one corner to its opposite is unlikely to be successful. Research has found that attempts to impose systemwide formal designs directly onto an individual event or case—to anticipate, fully deduce, and determine behavior in each instance from macro principles alone—are inadequate, if not illusionary. From the other side, an individual's reactive operations scarcely make for a widely tested template that can be applied to the system as a whole.

Instead of corner-to-corner movements, figure 3 indicates that reliability is enhanced when multiple shifts in scope are accompanied by multiple shifts in knowledge. Becoming more reliable means becoming more knowledgeable about varied things at variable scales. To that end, professionals approach and reach reliability through different skills than those for macro design and micro operations. Their approach is not direct, but indirect. System managers have to tack to reach reliability, much in the way that a sailboat does not get from A to B in a straight line, but rather frequently must cross into the wind to get there faster. To do that, however, requires knowing more than a straight line.

Specifically, we know from research that designers enhance reliability when they apply their designs less globally and relax their commitment to identifying principles that are meant to fully determine system operations. Both happen when designers contextualize design principles by embracing a wider range of contingencies in their analyses. They formulate alternate, more localized scenarios for system behavior and performance (the “scenario formulation and localized contingency scenarios” hub in figure 3). Food policy, for instance, works better when differentiating management protocols by crop or location (see Godfray et al. 2010, 813).

We also know that reliability is enhanced when operations shift from real-time reactions to recognizing patterns and anticipating their consequences across a run of cases of micro behavior and experience (the

“pattern recognition and anticipations” hub in figure 3). Here “recognition” means looking for and into patterns, and “anticipation” means not only having expectations based on those patterns but also being prepared for their implications. Some patterns may be visible at one scale rather than others (see Schelling [1978] on micro motives aggregating into macro behavior). By recognizing and anticipating patterns across cases, operators and managers learn to adapt, and better practices emerge. These anticipations and evolving strategies, based on empirical generalizations, trends, or other (quantitative or qualitative) patterns, are likely to be less formal than protocols developed through contingency analysis and scenario formulation. Signal detection and the ability to “read” feedback in terms of what these events indicate for the system as a whole are crucial for reliability management when operators don’t have full, immediate causal knowledge of the system they are managing.⁵

It is in this middle ground, bridging the formulation of design-inflected contingency scenarios realized more locally and the recognition of patterns and associated anticipations systemwide, that we find the reliability-managing professional networked with similar professionals. In the middle is where patterns and the anticipations based on them are probed, and where design-mediated scenarios are modified in light of the system patterns then pertaining. In the middle is where the skills in pattern recognition and scenario formulation reinforce each other, as when repeated pattern recognition helps increase sensitivity to context-rich differences—and vice versa.⁶ In the middle is where reliability managers exercise their skills of interpretation as they translate pattern and scenario into managing reliably. And in the middle is where the reliability manager must be the mess manager.

For the middle is where we see operators and managers maneuver across the performance modes of the preceding chapter to ensure the safe and continuous provision of a critical service. This happens, moreover, with respect to services for which there are no formal control rooms or dispatch centers or trading floors, only networks of professionals to ensure that a service is provided reliably.⁷ This middle is, in brief, the domain of competence for these professionals. To say that managers are operating competently and skillfully is to say that they are managing within their unique domain of pattern recognition, scenario formulation, and interpretation so as to maneuver across the performance modes as conditions change. Otherwise, they could not be reliable mess managers; otherwise, they would not be the professionals that they are in terms of managing mess and reliability together. As

figure 3 indicates, no one else operating in the cognitive space of mess and reliability management has this unique knowledge base.

All of this sounds mushy, so some examples are useful. Within that space, the worst mess for professionals to be in—as first sketched in chapter 2—is to be pushed outside their domain of competence. You, the mess manager, are being asked to operate beyond your skills and talents. To be pushed from the credit derivatives you know to the derivatives of derivatives no one comprehends is a very bad mess. In contrast, the best mess is being well within the domain of known patterns and scenarios and translation skills, where managers can use their unique knowledge to maneuver across multiple performance modes under changing conditions. In other words, for those who take reliability seriously, good mess management is what occurs well within their domain of competence, with known but different patterns and known but different scenarios—sometimes with time to spare, sometimes with hardly a moment left. For these professionals, the chances of managing a mess badly increases the closer it is to the limits of known patterns and scenarios—that is, the closer it is to the edge of the domain of competence (or what Paul Schulman calls the precursor zone). It is here where reliable mess managers are short of knowable options and where the options they have could have important but unknown effects.

This management is, again, without any guarantees. Bridging scenarios and patterns, each of which differ with the others, is the difficult part of the professionals' translation, because the interpolation involves transposing, transforming, and synthesizing scenario and pattern in light of others in order to manage in the present.⁸ Translation is needed if only because localized scenarios and systemwide patterns are drawn from very different knowledge bases (figure 3). Again, that translation is interpretative rather than literal, and this is how new or different knowledge is generated—though that process is not without its own risks, as we have seen.

But just what exactly is involved in “translation” or “synthesis” of patterns and scenarios? One way to start thinking about this is to recognize that the macro designers and micro operators around the two extreme hubs who talk about “risk,” “coordination,” and “learning” are frequently doing so differently from those in the middle domain. If the differences were appreciated by decisionmakers, those endless debates over planning versus implementation or comprehensive planning versus piecemeal incrementalism, among others, would have to be rethought. Let's introduce each briefly here, leaving fuller comments to later.

When professionals in the middle talk about objective risks in large technical systems, they mean not only worst-case scenarios that they have formulated or the hazards and frequencies that they have recognized. They also mean the risks that emerge out of the unique knowledge it takes to manage the systems across and within the four performance modes—each of which has its own dominant risk. Activities in the middle domain are not more certain and less risky (or less messy and more reliable); rather, the operating complexities and risks are multiple and change with shifts in scope of management and knowledge needed to manage reliably in that domain.⁹ The professionalism comes in knowing these differences and why reliability is risky in the ways it is.

Learning is also different for those looking from the middle to outside the domain of competence. The domain in figure 3 is not static. Patterns and scenarios are added to or dropped from the repertoire, as messes and the professionals who manage them adapt to changing circumstance. By implication, not only can macro-design “solutions” that bypass this learning pull professionals and their networks outside their middle domain of competence, but the interventions just as often fail to capitalize on the evolutionary advantage of these middle mess managers in improving reliability operations and rejiggering processes and technology to ensure those improvements.

“Coordination” must also be rethought. By calling for greater teamwork or stakeholder coordination, mess and reliability professionals in the middle often mean “bringing the system into the room” (Weisbord and Janoff 1995). To do so is to bring in those with expertise in macro design and micro operations, but also those who network patchy patterns and scenarios into reliability. This ability to reconnect disconnected activities in ways that better match or mimic the connectedness of reality is at the heart of the professionals’ translation.

If you look closely at figure 3, you will see that we are talking about professionals who are experts not because they “bridge” macro design and micro operations directly. On the contrary, professionals synthesize knowledge about planning and about operations into reliable services, however messy their translation may be in the face of uncertain success. One great mistake in conventional policy analysis and public management has been to assume that implementation is all about converting macro design into micro operations or that implementation at the micro level ends up as a kind of *de facto* policymaking at the macro level. Nothing could be further from the truth. Implementation takes place in the middle across a network of professionals. Here, the locus of implementation shifts away from micro operators—the fabled

street-level worker, including the cop on the beat, the teacher in the classroom, and the caseworker on a home visit, who may not even see themselves as implementing policy¹⁰—to networks of middle professionals and the risks they face. It is there where messy trade-offs and interpretative muddles are to be found between the pattern recognition and scenario formulation hubs, and where any better practices that emerge across a run of micro operations have to be modified in light of local contingencies.

Stay with those street-level workers for the present, because the differences between them and the middle domain of mess managers help us to understand just what the latter professionals actually do by way of managing for service reliability. Each of the two groups is oriented differently to the hubs and domain of competence, and the differences in orientation are instructive—although nothing is hard and fast here—when it comes to understanding the nature of mess management as discussed in this book.

First, there are differences with respect to pattern recognition. At best, street-level workers avoid labeling and stigmatizing clients: “Street-level workers do not see citizen-clients as abstractions—‘the disabled,’ ‘the poor,’ ‘the criminal’—but as individuals with flaws and strengths who rarely fit within the one-size-fits-all approach of policies and laws” (Maynard-Moody and Musheno 2003, 94). But in my extended framework, pattern recognition differs considerably from a macro design of one size fits all. For the mess and reliability professional, stereotyping is its own systemwide phenomenon, with its own patterns. For example, how do people vary in terms of education, age, ethnicity, income, or gender when it comes to stereotyping? Mess and reliability professionals want to know the better practices for dealing with such stereotypes when it comes to “juveniles” or the “disabled.” Street-level workers have to first know persons, though they too stereotype from time to time; mess and reliability professionals have to first know how populations differ, though they too work one-on-one from time to time.

There are differences with respect to one’s stand toward macro design. For the mess and reliability professional in a network, macro design is as disputed, incomplete, uncertain, and complex as any other hub in his or her operating space (we will see this in the overpopulation example that follows). There is no one overarching morality or standard when it comes to trying to avoid trade-offs. That is why professionals connect with other professionals in order to get anything done halfway reliably. For the street-level worker, the moral order is clearer: “For example, the decision to subvert the rules by an exasperated [social

service] counselor . . . redeems the state by breaking through the bureaucratic labyrinth” (Maynard-Moody and Musheno 2003, 24). Street-level workers may be willing to subvert departmental protocols and procedures in order to do the right thing. Mess managers in the middle managing for reliable critical services face a greater variety of plural values when it comes to rights or wrongs.

There are differences with respect to where the street-level worker and the middle professional stand with respect to localized scenarios. The street-level worker may have a more negative view of localized scenarios than the mess and reliability professional does, when those scenarios are protocols and rules devolving from departmental policy. For the street-level worker, macro policy and localized rules are much the same thing: the problem and a cause of difficulty. For the reliable mess manager, those localized rules are resources to be exploited in order to keep departmental services reliable, as task conditions change.

Differences in orientation to micro operations are also notable. For mess and reliability professionals, the individual case is a starting point from which to search out patterns over a run of such cases. How else do you find better practices? For the street-level worker, the individual constitutes the center of gravity of service provision. Numbers, trends, and procedures are really not the endpoint; the worker’s relationship with the client is. “Indeed, the worker’s decision of when to conform to rules and procedures and when to break them and when to cooperate with authority and when to act independently is the essence of street-level judgment” (Maynard-Moody and Musheno 2003, 68).

Finally, there are also differences in the stand the two groups take with respect to what I have been calling “the middle.” For street-level workers, the middle drives the system and is very much part of the problem: “In their stories, the system is described as an undifferentiated amalgam of other units in their agency, other agencies, elected officials and the media. . . . Street-level workers see themselves as moral actors working in opposition to the system and rarely describe themselves as part of it” (Maynard-Moody and Musheno 2003, 22). For the mess and reliability professional, the middle is far more differentiated, set as it is between the hubs that bookend it—namely, localized scenarios and recognized systemwide patterns that rely on different mixes of knowledge.

To summarize, for the reliable mess manager, patterns and better practices matter as much as protocols and procedures, and it is within networks that these are to be managed. For the street-level worker, face-to-face relationships matter more than protocols, and headquar-

ter networks are power elites to be circumscribed, when not circumvented. When the latter happens, the street-level worker can be part of the bad mess in which middle mess managers find themselves. From the other side, when there is no network of reliable mess professionals in the middle (assume that they're all operating in unstudied conditions), the street-level worker is indeed alone, acting in ways that necessarily equate professionalism with reliable micro operations.

Before next turning to a specific policy application of the framework, a preceding point must be highlighted. Where you see one mess and reliability professional, you see a network of them. Policy messes are so complex that a reliable mess manager in the middle cannot manage any one of them on his or her own and still be reliable. There has always been something dangerously misleading in public policy and management literatures that perpetuate deracinated notions of "policy entrepreneur" or "change agent," as if each were the counterpart to the solitary street-level worker.

An Application

Arguably, the world's most important mess when it comes to public policy and management has been the long-standing controversy over global overpopulation and associated overcrowding.¹¹ The crisis narrative is a familiar one. Human population numbers—some seven billion people with a net increase of over seventy-five million a year (see, for example, Bloom 2011; Wolf 2003)—threaten our planet with unprecedented overcrowding, environmental spoliation, and resource conflicts. We are fast approaching, if we are not already past, the sustainable limits of water, clean air, and energy. Without population restrictions, including but not limited to birth control and growth limits on cities and all manner of resource utilization, the globe is headed for irreversible decline, assuming that has not already been assured. *The Long Emergency* (Kunstler 2005), not *The Long Boom* (Schwartz, Leyden, and Hyatt 1999), is under way.

Consider the numbers, we are urged. In the early 1950s, global population was predicted to be 3.6 billion by 2000; the actual figure was more like 6.1 billion (R. Cooper and Layard 2002, 8). The planet's population has been forecasted to reach up to 12 billion by 2050 (9). What about our natural resources? The Food and Agriculture Organization of the United Nations calculates that forest loss has been huge: a net loss of 6.4 million hectares between 1990 and 1997 alone (Kaiser 2002, 919). Projections for

energy and water use signal terrifying depletions (Brown 2002). More than half of the world's population turned urban in the first decade of the twenty-first century; a century or so earlier, urban populations represented less than 15 percent of the total (see, for example, Crossette 2002; Greenhalgh 2010). Surface temperatures have risen over the last century, and global climate change continues unabated (Ramanathan and Barnett 2003). The world's greatest problem is population growth, according to James Watson and Francis Crick, the discoverers of DNA (Daugherty and Allendorf 2002, 284). What, Jared Diamond asks in *Collapse* (2005), was that Easter Islander thinking when cutting down the island's last tree? Two conservationists in *Science* conclude: "One word sums up the overall and long-term problem [in creating a sustainable future]: overpopulation. We wonder how any sane person could disagree" (Wright and Okey 2004, 1903).

Here is how sane people disagree. First, the numbers are disputed, and population projections remain full of uncertainties (see, for example, Walker 2009). The United Nations revised its global population projections substantially downward at one point, and it was estimated that the total would be around nine billion by 2050 (see, for example, Chamie 2010, 157; United Nations 2003). The figures were subsequently revised upward, to just over ten billion by 2100 (Gillis and Dugger 2011; R. Lee 2011). "There is, however, considerable uncertainty surrounding these projections," as a professor of economics and demography insists (Bloom 2011, 562). One study indicates a forest loss of 20 percent less than the original Food and Agriculture Organization estimates, while major water-use projections have been overestimated (Brown 2002; Kaiser 2002). The only certain thing about global energy projections is that they are wrong, if we believe the experts. Temperatures have been increasing, but a vigorous controversy continues over what this actually means regionally and in terms of costs and benefits (again, start with Ramanathan and Barrett 2003). Instead of focusing on that Easter Islander, we might just as well ask what European explorers thought they were doing when they knowingly introduced venereal diseases to the Pacific (N. Thomas 2003, xxv–xxvi). Finally, and with all due respect to Watson and Crick, when did they become experts on population growth?

Other problems with the data and methods must be registered. Strong taxonomic biases in documenting species have long existed in conservation research (Clark and May 2002), estimates of biodiversity losses remain disputed, and there are those who consider global urbanization to have net benefits for controlling total population numbers—for example, family size and birthrates tend to drop when populations

become more urban (Revkin 2002). We must, of course, tread cautiously here. I am not saying that there is nothing to worry about by way of overpopulation—no one wants some ecologists equating him or her to a Holocaust denier.¹² Does this mean, then, that analysts are wedged between two conflicting narratives with respect to population and crowding, waiting for the evidence to free them?

Figure 3 suggests how to sort out this policy mess. Explicit in the call for population curbs, particularly those limits on growth and births, is the macro-design concept of a global carrying capacity, which is the upper limit or cap on the total number of people that the planet can support without collapse. The idea that the level of sustainable population can be derived from a calculation of global carrying capacity is contentious on several counts, however. First, which global carrying capacity estimate do we rely on? At the time of writing, the only certain number has been sixty-nine, which is the number of past studies reviewed in a meta-analysis of the widely divergent estimates of global carrying capacity. The meta-analysis found the lower and upper population bounds were 0.65 billion and 98 billion people, with its best-point estimate of 7.7 billion (van den Bergh and Rietveld 2004). Second, major ecologists doubt whether there is a “carrying capacity” for arid and semi-arid lands, which constitute much of the surface area of the planet (Roe 1999; see also Scoones 1996).

As for the other extreme, the micro operations of overcrowding—the actual experience of overcrowding—are full of distinctions. What feels overcrowded to someone in Europe need not be so to someone in Southeast Asia. What feels overcrowded to rural residents may not to urban residents within the same country. Even when both sets of residents concede that their areas are overcrowded in the same way, one group might say the solution is not fewer people as much as it is more education or technology. Even if they agreed that their areas were overcrowded for exactly the same reasons with exactly the same effects, it is unrealistic to believe that anyone knows enough, no matter what his or her expertise, to recommend what the actual population levels should be for a wide area concerned. It is difficult enough for a long-term resident to make such judgments for his or her smaller locality, let alone the most complex ecosystem there is: the planet.

As we tack from macro design and individual experience in figure 3, we add to the knowledge bases about population, age structures, population densities, and related factors. We have already seen that the very different global trends and generalizations do not match the dominant, more uniform macro narrative about global overpopulation

(that is, we have noted the differences between carrying capacity as a macro-design concept and the actual variability in estimates across the globe at the pattern-recognition hub).

Substantial differences also emerge when we move the analysis from macro design to localized contingency scenarios. Stay with global carrying capacity as core to the determination of overpopulation at the macro level. When we move from that governing concept to its regional counterpart, it turns out that a handful of the world's regions—most notably India, China, Pakistan, Bangladesh, and Nigeria—have accounted for recent major increases in world population (Wolf 2003), and other substantial regional differences persist (Roberts 2011). Indeed, birthrates have started to decline in China, while fertility rates in Bangladesh are projected to decline (Walker 2009). So what are the carrying capacities of these specific countries, and who knows enough to give that answer for the next twenty or more years?

Once we stay focused on conventional regions of the world, Europe comes readily into view, as a big policy mess there has been shrinking population levels and declining fertility relative to health and social service demands (Lutz, O'Neill, and Scherbov 2003; Ringen 2003; see Walker 2009 for intra-European differences). Other regionalized protocols and scenarios come to the fore as well. Concern for climate change at the global level has moved to developing and improving regional climate models, just as national weather models have become more regionalized (Kerr 2004). There are clear regional differences in climate changes and their effects on species, for example (see Myers and Pimm 2003).¹³

Now, let's plot these positions and findings for the overpopulation and overcrowding controversy in a mess and reliability space (see figure 4). The dimensions and plot of positions in figure 4 help us to answer these questions: Just who are the mess and reliability professionals in this controversy? Who is competent enough to move across the four hubs and translate the system patterns and regional scenarios into reliable service provision (be they for water, air, or energy) that are said to be challenged by population growth and overcrowding?

Whoever the middle professionals are—again, they most certainly are not all in control rooms—they have different knowledge bases than those at the extremes of macro design and micro operations. They must work somewhere between the regional (localized contingency scenarios) and the global (system pattern recognition). We must also expect that the professionals and their networks are already there—they do not have to be created from scratch. For highly controversial

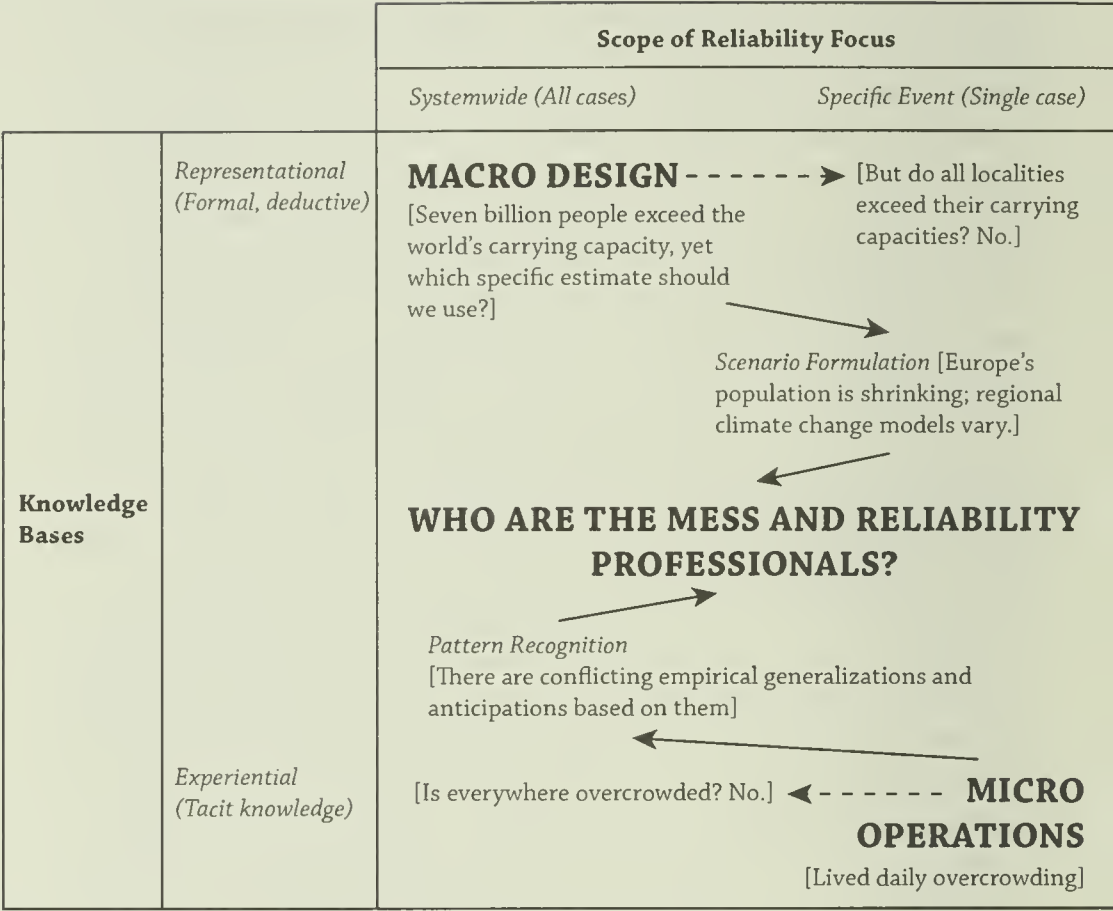


Figure 4. Mess and reliability space for the policy mess relating to global overpopulation and overcrowding

Source: Adapted from Roe 2007

policy messes like the one regarding overpopulation and overcrowding, we can assume that almost all points in the mess and reliability space are occupied.

But why are we interested in these professionals? It is not because they have the “solution” to overpopulation or overcrowding, but because the policy messes around the four hubs have to be translated, if possible, into unique knowledge for securing more reliable services in the face of all manner of population and crowding pressures. Look again at figure 4 and move to the middle from the localized-scenario and pattern-recognition hubs. What falls between a major region, formally “Europe” or “Southeast Asia,” and the globe? One familiar answer is the classic nation-state. Choose two countries whose populations are treated as having similar systemwide patterns and localized scenarios when it comes to this policy mess—that is, the citizens of

both countries by and large say they are overpopulated and overcrowded and will become increasingly so. In this way, the countries are taken to share the features purported to exist in the dominant crisis narrative about worldwide overpopulation and overcrowding. For example, choose the Netherlands and Singapore. Ask people in both places “Is this country overcrowded?” and you would probably get a qualified “Yes.” The population densities are perceived to be very similar between the highly urbanized western Netherlands—the Randstad—and Singapore (Roe and van Eeten 2001). Now the question to ask is: Based on experience and familiarity with the two countries, what policies enable their residents to accommodate their human populations? Or bluntly, when the countries are perceived to be overpopulated, why aren’t more and more of their citizens being pushed outside, beyond the national borders?

From a management perspective, a country is overcrowded and overpopulated when its mess and reliability professionals have few ideas about how to keep people residing, employed, and productive there. Countries can move in and out of conditions of over- and underpopulation and over- and undercrowding, depending on the livelihood strategies adopted by their residents. This means a country that is not overcrowded can become so, even if population numbers or densities do not change. All that needs to happen is that the management of its policies worsens. This suggests that an explicit management goal of economic and social policy of a country or region should be one of retaining and sustaining people who are already there and want to stay. The Netherlands and Singapore risk becoming (more) overpopulated and overcrowded only when increasing numbers of residents there want greater well-being yet choose to leave, even if they are uncertain as to whether their greater well-being lies somewhere else. They are pushed out, rather than pulled elsewhere.

This translation of the policy mess of overpopulation and overcrowding stands in sharp contrast to current orthodoxy about global population increase. Our new policy narrative does not claim that overpopulation and overcrowding are not problems; then again, it does not claim that one country’s medley of policies for addressing population and crowding will or should work elsewhere. There is a story here, but it is unique and does not have the same ending for everyone. It is a contingent narrative, provisional on how the networks of professionals translate the patterns and scenarios involved for where they are.

What the new policy narrative does claim is that the dominant narrative and those who criticize it without offering alternatives avoid, dis-

regard, or dismiss the middle domain of competence. The dominant crisis narrative insists: System trends are this way, and therefore macro solutions must be that way. But there is no “therefore” when we are in the middle, looking out. Why ever would we jump from pattern recognition to macro design without first consulting those who are already addressing population and crowding in varied and instructive ways? We return to and expand on this point in the next two chapters, which discuss what makes for bad and good mess management.

It should go without saying that the mess and reliability professionals who deploy this translation of an overpopulation and overcrowding narrative vary from country to country and cannot be equated to any single cadre, such as macroeconomic planners. The professionals I’m talking about are the ones who excel at cross-scale, context-dependent, case-by-case analysis. When it comes to dealing with population and crowding, they are the ones who are adept at finding several ways of achieving the desired policy ends, albeit sometimes with little time to spare and without “proper” planning. They bring others into meetings so that the entire system is better represented. They seek to recouple what has been decoupled through disciplinary specialization, program fragmentation, and agency turf battles. They continue to search for better practices to avoid losing options; they distrust estimates of hazard when it is not based on intimate knowledge of the system to be managed; and they frequently strive to achieve flexibility—though they never get as much slack as they can reliably use—in the provision of services that society considers critical. Of course this is messy, but there is no other way to be as reliable.

This recoupling through management of what has been decoupled organizationally is critical to professional mess managers. But how does it work? I once attended a presentation on an ecosystem restoration project in Montana. A leader of the project described his take on its key contribution: He could now see how his forested acres fit into the wider valley landscape. The approach gave him a way to integrate the small and large scales, with cross-scale implications both ways. Not only could the project leader stand in his woodlot and see its role within the larger scale of the ecosystem and landscape, but he was able also to plan at the smaller scale for the longer term. Similarly, as the ecosystem manager stands at the ridge looking down into the valley, she is able to plan at the larger scale for the shorter term. She can now see what the next steps are when it comes to managing the entire ecosystem. “Think globally, act locally” becomes “Think long term from the small scale, act real time from the large scale.”¹⁴ If and when

this happens (again, no ironclad assurances here), recoupling—as messy as it might be—can end up reworking policy and management.

The difficulties with recoupling lie in searching far and wide for better practices and in having both the requisite contextual knowledge so as to formulate a local scenario and the know-how to modify the better practices in light of that local context. In this way, “context” is brought into the analysis not just at the aggregation stage across a run of cases (what we have been calling pattern recognition) but also in the modification of these practices in light of the relevant local scenario(s). In terms of figure 3, we are in the domain of professionals, seeking to apply and modify systemwide better practices with respect to ecosystem management to the local scenario at hand, which is rich in its own specifics. Professionals ask, “Who has figured it out better, and how can that be modified for use here?” This is how small actions add up to big effects: Local actions are based on broader practices that have been found to work in similar situations, where the learning involved in modifying the practices to the specific site can and should feed back into the broader knowledge base of what works by way of management. The great advantage of learning this way is that better practices import the scales at which management actually works across a run of cases without having to prejudge what are “the right planning areas.” If this sounds like old-fashioned incrementalism—though it is nothing like the version I was taught—then call it “Incrementalism,” where the capital *I* indicates a scope of search for better practices that aspires to be truly international.

It should go without saying that this process of feedback and updating better practices is dynamic: There is never a “best practice,” and even the economists’ default to second-best solutions may still be far too simplistic. Current better practice is not some kind of macro standard to which we all are meant to aspire. This is not about measuring any one-meter stick against the hermetically sealed international standard meter bar at the Bureau of Weights and Standards outside Paris. Better practices are more akin to pointing out how this heart I am looking at on the screen compares to those digitized ones that I am using by way of comparison. Where does this heart fit into those that are said to run the gamut from healthy hearts to unhealthy ones? Too many decisionmakers look for the equivalent of platinum bars in policy and management while ignoring the instructive specimens in front of them, each a messy original on its own but sharing family resemblances with others. In the language of narrative analysis, better practices transform patterns into stories that can be used by decision-

makers. To put it differently, better practices ensure that the emergent behavior of micro operators is not reducible to “just statistics” but has meaning for management in ways that substantively differ from those stories told by macro designers, including policymakers and lawgivers.

Speaking of which, what family resemblances do this framework and its implications identify for conditions leading up to and including the 2008 financial mess?

Turning Back to the Financial Mess

It takes only a few small steps in the crisis narrative to move from insisting that there are too many people on the globe to concluding that these people are now globally interconnected, and importantly so. In this logic, more people mean more resource scarcity, and fewer resources mean more interdependence, and more interdependence is just what has been happening through globalization policies that integrate economies together—and their financial systems. Many such examples exist: At one point, for instance, the announcement of even more quantitative easing in the United States was followed a few hours later by the Mumbai stock market moving to its highest level in nearly two years (Sri-Kumar 2011). A *Financial Times* correspondent deduces: “There is a strong case to be made that the current [financial] crisis is in the strictest sense a crisis of globalization” (Guha 2009a).

What does our framework have to say about this line of argumentation? Start with the major macro-design position on financial globalization prior to the events of late 2008: The integration of a country’s financial markets into the world’s economy increases that country’s economic growth and worldwide economic growth. Given figure 3, we can expect that other positions in the mess and reliability space for globalization would differ substantially from this macro position, and that was the case well before the financial upheaval. First, economic growth under always-late capitalism has never been uniform across the globe. There really is no one “protocol” for economic growth worldwide. According to the head of the Global Economic Research unit at Goldman Sachs, since 2001 (but before the financial mess), the handful of BRIC economies—Brazil, Russia, India, and China—“contributed about one-third of all global growth” (O’Neill 2006, 12). Not only does the macro-design position for financial globalization not conform to the existing but differing scenarios for emerging economies, but the systemwide patterns and trends also vary significantly from the macro

standpoint. Prasad and Rogoff reported earlier on the findings of a study on globalization's effects:

Interestingly, the more financially integrated developing countries do seem to have achieved higher per capita incomes than others. However, it becomes difficult to make a convincing connection between financial integration and economic growth once other factors, such as trade flows are taken into account. . . . We found that financially integrated developing economies have in some respects been subject to greater instability than other developing countries. (2003)

As for examples among developed countries, there never was one "European social model" from which to design individual welfare systems. Rather, a handful of social models were discernible in the empirical evidence across Europe, none of which applied directly to any single country's scenario without a good deal of translation (see, for example, Sapir 2005). Certainly, when it comes to the global financial mess, some regions and countries—notably Canada and Australia, as we shall see—came out relatively unscathed.

Let us stay with the difference between the pattern-recognition and macro-design hubs a moment longer, because even thoughtful commentators on globalization conflate the two. Martin Wolf took this to be one of his "ten commandments of globalization": "It is in the long-term interest of countries to integrate into global financial markets. But they need to understand the need for an appropriate exchange rate regime, often a floating rate, and a sound and well-regulated financial system" (2004). This statement, cast as a principle, is at best an empirical generalization contingent on a reading of the weight of evidence—that is, pattern recognition—at the time. Patterns, however, are not macro principles, and we will see in chapter 4 that such a conflation of hubs can lead to very bad mess management. While it would be a fairly simple matter to continue showing how positions in the globalization space differ, the core issue circles back to these questions: Who are the mess and reliability professionals in the middle who can make sense of this globalization space? Whose task is it to reconcile these conflicting and complex positions in the name of reliably managing globalized services, such as finance?¹⁵

Let's return to the media reports about the 2008 financial upheaval. You would think the real managers in the global financial mess were senior officials in Treasury departments, central banks, and finance ministries. In our framework, those decisionmakers are better understood to have been macro designers acting reactively as micro opera-

tors. If so, this should be troubling to anyone interested in the reliability management of major financial institutions. We cannot and should not expect senior officials to be the primary professionals who actually determine whether the bailout and other interventions achieve and sustain reliable real-time financial services, as messy as the aftermath of the financial meltdown must be. Baron de Montesquieu, the French political thinker who was also criticized from many sides, once compared himself to someone living on a second floor “disturbed by the noise upstairs and the smoke downstairs” (quoted in Todorov 2009, 27). Caught as they are between loud macro designers and firefighting micro operators, many reliability professionals in the financial mess doubtless felt and still feel the same.

Who, then, are the real-time managers and operators called mess and reliability professionals when it comes to the financial upheaval? We introduced them in chapter 1, but the framework is now in place that connects them and underscores the seriousness of their role. They are the members of that unique class of professionals—especially middle-level managers and support staff—whose supervision, informal networks, and skills ensure that financial services do not fail as often as they could. As we have discussed, you find them in IT units, accounting units, engineering divisions, line operations, business continuity staff, inspectorates and supervisory units, auditing departments, and regulatory and legislative offices as well as on trading floors and in the field, and not just working in the area of financial services.

Some in the executive office suite, like the chief financial officer or immediate staff, might be part of the network, though they are scarcely leading all the real-time operational decisions involved in managing reliably. Occasionally the middle-level staff and specialists appear in the press as self-identified “plumbers” (Grant 2009b; O’Connor 2008), but they rarely surface to the public’s attention—and when they do, even more rarely are the networks in which they work made visible. In fact, some call this managerial and networked know-how “dark matter” (Hausmann and Sturzenegger 2005). This means that there is absolutely no reason to believe all major executives have this operational knowledge, though some of the founders of the United States, for instance, insisted that it should be otherwise.¹⁶ During the financial mess, we witnessed the tribulations of a private equity investor in a major car firm who, by one account, “did not have a clue about the automobile industry” (Story 2009); the partial dismantling of another major automobile firm by “a not-quite graduate of Yale Law School who had never

set foot in an automobile assembly plant” (Sanger 2009); and the new chairman of that firm who admitted, “I don’t know anything about cars” (Gapper 2009). Also in the period leading up to the financial mess, we witnessed the problematic role that consultants played when they saw their task as one of macro-designing system changes rather than supporting networked professionals already in those operations. For example, Citigroup’s “reliance on outside consultants for strategic advice on credit instruments contrasts with the practices of rivals that fared better than Citi in the crisis, such as Goldman Sachs and JP Morgan”; the latter relied on in-house talent before and during the meltdown (Guerrera and Politi 2010). For the time being, think of this kind of know-how as one depending “on complex mixtures of judgment, problem-solving and information exchanges, often involving group behaviour that is difficult to replicate” (Manyika 2006, 13).¹⁷

Summing Up

We are now positioned to say much more than that a policy mess is an amalgam of uncertainty, complexity, conflict, and unfinished business, or that it varies in terms of the performance conditions. This chapter’s framework enables us to define and summarize more formally what a policy mess is and the management it entails.

A policy mess is any controversy or issue, the multiple and differing standpoints of which can be sorted out into the four hubs of macro design, micro operations, scenario formulation, and pattern recognition. For our purposes, a policy controversy is not really a mess until different and conflicting positions across the different hubs are taken on the issue. Management is to sort out the different positions at each hub and across hubs, and the following two chapters show how that can be done poorly or done well. Whether reliable mess managers in networks of like professionals can extract a good policy mess from a bad one, or stop a policy mess from going bad, depends on their unique knowledge of how to synthesize patterns and scenarios into reliable service provision. Pattern recognition and scenario formulation are, if you will, the oxygen of that management.

In a policy mess, gaps in knowledge always exist between macro design and pattern recognition, between scenario formulation and micro operations, and between pattern recognition and localized scenarios. A gap does not mean the respective hubs are polar opposites, only that different blends of deductive and inductive knowledge sepa-

rate them. When it comes to mess and reliability management, what a manager holds at the level of macro theory for the system and what that professional finds in practice at the system level *necessarily* differ. Similarly, system patterns and the anticipations based on them inescapably differ from local scenarios that seek to contextualize design considerations better. It should never surprise any serious manager to find a gap between what a regulation says formally and how its requirements are realized in a given region or between that formal regulation and what is actually found in emerging practice across multiple regions. In fact, to try to ignore such gaps is to turn reliability management into bad mess management, thereby undermining the critical service these professionals are trying to provide.

Finally, I have been writing as if policy messes are good, bad, or ready to go one way or the other, depending on how they are managed. But, as we already saw, some messes are good and bad at the same time, and that fact raises a question we should be asking about all policy messes: Just what are we managing for? The painter Gérard Fromanger points out that a blank canvas is white but also “black with everything every painter has painted before me” (quoted in Shatz 2010)—and so too there are messes that are both bad and good in the same instant. Bad policy mess: It is said that one out of every two young African-American men in major urban areas is enmeshed in the criminal justice system. Good policy mess: Why, then, are we not interviewing the other 50 percent of young urban African-American males outside the criminal justice system to find out what they are doing, and what the rest of us could learn from them?¹⁸ Bad policy mess: At one point, three to four billion people—up to two-thirds of the world’s population—lived in regions without adequate water supplies or sanitation (see, for example, World Health Organization 2007), a dire situation for development agencies and experts to address. Good policy mess: Now that is a very large number of people, right? This is such a huge distribution of people without adequate water supplies, that some of them must be doing much better than the others. That means then there are tens of millions—hundreds of millions?—of people who have many things to say about how to better survive without adequate water to those millions more who are also trying to survive without it.

So the next time someone complains, “The economy is in a mess,” press them a bit: Is it that trends observed at the systemwide level are at historic lows; or that the trends differ from some design optimum, as when economists talk about the output gap; or that individuals they know are having a harder time? Or is it that, while all this is going on, a

good part of the mess lies in the hodgepodge of bustling economies mixed in with deep-recession others, depending moreover on how “the economy” is defined locally?

That good and bad mess can go together—and that the task may be to pull the good mess out of the bad—is also illustrated through the example of one favorite whipping boy of public policy: government subsidies and interventions that encourage redevelopment of areas that have repeatedly flooded. A flood breaches the levee; the houses, roads, telecommunications, sewers, and electricity lines are destroyed—and what does the government do? It rebuilds the levee so that the redevelopment of critical services starts all over again! Really, how dumb can the government be, right?

Wrong. For my part, I would also want to know if the flood enabled the telecommunications provider, for example, to replace legacy equipment it could not replace otherwise due to prior regulatory and insurance considerations. I’d want to know what eventuality that provider prefers: (1) taking advantage of the opportunity to replace out-of-date or unprofitable equipment it could not replace except as a result of emergency action during the “bad times” of a flood; or (2) having to maintain its market share by severe cost-cutting for equipment maintenance, repair, and replacement, as a result of man-eat-dog competition during the “good times” between floods. Such two-sided policy messes are extremely important because their pushes and pulls force decisionmakers to focus on asking what we all should be asking of any policy mess, be it in health, environment, social services, finance and banking, or another arena: Just what mess are we managing, and how are we undertaking that management? The next two chapters answer those questions.

FOUR

BAD MESS MANAGEMENT

The first task of a good mess manager is to avoid managing policy messes poorly. So far, bad messes and bad mess management have been discussed in the same breath, with examples drawn from the critical infrastructure field. We're now positioned to distinguish between bad messes and bad mess management and, in the process, underscore the importance of knowing what makes for bad mess management across a variety of policy and management arenas. Managing poorly ranges from creating more muddles than already exist to producing really bad messes. I start by returning to chapter 2's bad and worst messes and then move to a longer discussion of the principal ways messes are managed poorly. There are many ways to screw things up in policy and politics, but figure 3's mess and reliability space highlights several pivotal ones revolving around those hubs of macro design, scenario formulation, reactive micro operations, and pattern recognition. In particular, you make a policy mess worse by trying to manage it from one hub only, by confusing one hub for another, and by jumping from hub to hub in all manner of leaps of faith that ignore, undermine, or otherwise avoid reliable mess managers in their middle domain of professional competence.

Going from a Bad to a Worse Mess: No Known Patterns or Scenarios

We saw how the autumn days of 2008 were fresh with panic after the bankruptcy of Lehman Brothers. The federal bankruptcy examiner of that collapse found "each Lehman trading desk had its own method for pricing assets and there was little consistency across desks as to methodology" (Valukas 2010, 501). "Frankly, everything is uncertain right now," a property developer told a gathering of bankers, business leaders, and decisionmakers in Moscow later. "We don't know whether to cut any contracts in roubles or dollars, or something else. We don't know what prices for anything will be, what demand will be, what our

market will look like” (quoted in Tett 2009b). When the failure of practices hitherto grounded in trends and patterns combines with nonexistent or otherwise wildly divergent contingency scenarios, nobody—and that includes the bridging mess and reliability professionals in banking and finance—can credibly claim to know what to do next.

It is one thing to be pushed into these unstudied conditions by an earthquake, tsunami, or other disaster. It is quite another matter to rush deliberately into what you don’t know and then wonder why this turbocharges a crisis. Turnover was so high in the financial trading sector before the 2008 meltdown that there were few traders left who had experience with the derivatives-and-leverage collapse of the hedge fund Long-Term Capital Management in 1998. Jeffrey Aronson, the chief executive of a New York-based hedge fund, told the *Financial Times*, tongue only slightly in cheek:

I think the best thing about working on Wall Street is that people can’t remember what they did yesterday. It’s remarkable. We do not use leverage in our distressed-security strategy. Now that times are better, some people have asked us, why don’t you employ a little leverage? People forget. They said it wasn’t so bad, maybe if we use a little leverage to enhance our returns, that’s an OK thing to do. A little more time passes and maybe let’s use a little more leverage, and before you know it we’ll do it all over again. (quoted in C. Freeland and Demos 2010)

Not to put too fine a point on it, some financiers willfully enter areas for which there are no known system patterns, no known localized scenarios, and no known managers to reconcile both—however messily—into something reliable. This kind of behavior is referred to as “faith in our financial system.”

Nor are investors and bankers alone in making such leaps. The president assures us of weapons of mass destruction that are not there. His second in command says there will be cheering in the streets when we arrive. The secretary of defense tells us the war will cost a fraction of what it costs. His second in command assures us that oil revenues will fund the war. The secretary of state gives the United Nations misleading information, and the head of a major intelligence agency says the invasion will be a slam-dunk. And so on in what ended up as a conga line of ignorance because—and this is the essential point—when you are outside your domain of competence and deliberately in unstudied conditions, you can believe anything you want and ignore anything you don’t want to hear. This has been demonstrated by preceding and succeeding presidents as well.¹

As for banking and finance, we know people in that sector were operating outside their domain of competence when that “super-senior debt,” whose triple-A debt rating made it “nearly as riskless as Treasury bonds,” brought AIG, the multinational insurance corporation, to its knees because that debt no longer had a market (see, for example, Tett 2008b). We know they were operating outside their domain of competence when British banks had become “so fragile that Northern Rock, which was nationalized after it collapsed, is now perceived to be the safest place for savings because its deposits are guaranteed by the government” (Werdigier 2008). We know they were operating outside their domain of competence because all this talk about safety and risk was so wrong-headed.

The financial mess has been called “the mother of all risk management failures” (Cifuentes 2008, 30). This is like thinking that walls tumble down around us because they are not supported by the best wallpaper. Once you are unable to calculate the probabilities and consequences of failure, all calls for better risk management are beside the point. You can’t manage risks if they can’t be estimated. So when reliability standards atrophied (as in housing appraisals leading up to the mortgage crisis) or were nonexistent (as in some over-the-counter derivatives), risk is incalculable. To be outside your domain of competence is to be undertaking activities that are dangerous precisely because risk assessment and management cannot navigate all that unpredictability. “It seems to me that in the whole of economic thought,” Paul Samuelson argued, “you cannot find an adequate solution to the problem of uncertainty as different from risk” (quoted in Pizano 2009, 117). Yet this confusion between risks that can be calculated and unstudied conditions that can’t be continues. A 2012 JPMorgan scandal (which also involved derivatives) led two business-page commentators to conclude: “The problem may be that JPMorgan, because of its size, has created a new risk: it’s too big to manage” (Eavis and Craig 2012). If a major interconnected firm truly becomes too big to manage, that is not a new risk, but something altogether more fearsome: a potentially unmanageable uncertainty and hazard.

How much was finance and banking operating in unstudied conditions leading up to the 2008 panic? The answer certainly wasn’t hidden from view in media reports. A Citibank study found that one daily change in the dollar-yen exchange rate was nearly eleven times the standard deviation. According to one commentator, Benoît Mandelbrot, “Not if Citibank had been trading dollars and yen every day since the Big Bang 15 billion years ago should it have happened, not once” (quoted in Coggan 2004). More memorably, a sequence of “25 standard

deviation" trading days occurred on the U.S. stock market, *each* of which should have happened only once in every 100,000 years (Authers 2007). "If stocks really followed a bell curve . . . then a swing of more than 7 per cent in a day for the Dow Jones industrial average should happen once every 300,000 years. In fact there were 48 such days during the 20th century" (Mandelbrot quoted in Authers 2009b). If, as has been argued, the financial meltdown was "a once in the lifetime of the universe" event (Eadie 2010), then what sense does it make even to talk about a distribution of chances?

How dangerous is it to mistake risk models for the reality of unstudied conditions? Presumably the more types of risks in any given market, the more hazardous it is not to be able to measure them. Only four major types of risk were identified with respect to chapter 2's performance modes for reliable mess management. The reality is that "the list of risks that has been added to investors' check lists has grown" (van Duyn and Tett 2009). Some banks believe there are at least nine risks to be assessed, only one of which is said to be operational. The nine include risks associated with leverage, concentration of investment, and liquidity (Authers 2009a). The more risks there are to measure, the more difficult it is to measure any one of them, and the more that ignorance is a threat to management. After a point, this is a bit like asking you to commit to another human being who turns out to be a complete mystery.

None of this is to insist that system patterns and local scenarios must be clear in order to manage mess reliably or reliability messily. Policy messes are, to repeat, characterized by all manner of positions that are complex, uncertain, disputed, or incomplete. That said, where no patterns or scenarios exist but where you want reliability in the driver's seat, we should expect pressure to move from prevailing and conflicting macro and micro orientations to pattern recognition and scenario formulation. A nonfinancial example of a major management mess under such pressures is instructive.

For years, the use of fingerprinting and analysis of bullets, hair, and handwriting has revolved around a macro-micro axis:

Traditional forensic scientists seek to link crime scene evidence to a single person or object "to the exclusion of all others in the world." . . . They do this by leaning on the assumption of discernible uniqueness. According to this assumption, markings produced by different people or objects are observably different. Thus, when a pair of markings is not observably different, criminalists conclude that the marks were made by the same person or object. (Saks and Koehler 2005, 892)

The primary difficulty in the conventional approach has been its reliability (Begley 2004). A former editor of *Science*, Donald Kennedy, concluded,

The problem . . . is that its reliability is unverified either by statistical models of fingerprint variation or by consistent data error rates. Nor does the problem with forensic methods end there. The use of hair samples in identification and the analysis of bullet markings exemplify the kind of “scientific” evidence whose reliability may be exaggerated when presented to a jury. (2003, 1625)

A study of eighty-six wrongful convictions found that over 60 percent had erroneous forensic-science expert testimony as a contributing factor—the second most common one next to eyewitness errors (Saks and Koehler 2005, 893). Indeed, “error rates [have been] as high as 63 percent for voice ID, 40 percent for handwriting, 64 percent for bite marks, [and] 12 percent for hair” (Begley 2005a; see also Mnookin 2003; Santos 2007). At these magnitudes, dog sniffing is more reliable, with highly trained dogs having reported error rates of 30–40 percent (David 2004, 42). As for eyewitness testimony, a U.S. judge recently summed up the situation this way: “Study after study revealed a troubling lack of reliability in eyewitness identifications. . . . Indeed, it is now widely known that eyewitness misidentification is the leading cause of wrongful convictions across the country” (quoted in Weiser 2011).

That is not the mess forensic scientists want to be in. From our framework perspective, it is not surprising that forensic science is being pushed to greater reliability by moving to the hubs of pattern recognition and localized scenarios through “developing measures of object attributes [for hair, fingerprints, teeth], collecting population data on frequencies of variations in those attributes, testing attribute interdependence, [and] calculating and explaining the probability that different objects share a common set of observable attributes” (Saks and Koehler 2005, 892). More reliable databases from which clearer patterns and practices emerge are a specific focus for plugging the holes in current forensic science (Fountain 2009). As “basic knowledge grows, experts will be able to inform courts about the relative strengths and weakness of their theories and methods, and suggest how that knowledge applies to individual cases” (Saks and Koehler 2005, 895). Whether or not this is a paradigm shift (Begley 2005a), it is very much a major movement to different hubs in forensic science’s mess and reliability space.²

It is too early to say whether a comparable paradigm shift has been taking place in the securitized banking and finance sector, a significant portion of which operated outside established patterns and scenarios during the financial turmoil. What pathways financialization and securitization take in the future and how global imbalances will work out in terms of current account deficits and surpluses remain unanswered questions at the time of this writing. The same holds for the future of fair-value accounting and use of “dark pools” of liquidity for transactions outside conventional price discovery (on the latter, see Grant 2009c). Reporting on dark pool prices, for example, “in both the US and Europe is notoriously unreliable” (Lex Column 2010).³ That said, better financial practices are emerging, although that development has yet to be widely reported in the media (for an early discussion of possible improved practices resulting from the financial mess, see Ackermann 2008).

It is important to understand that the emergence of better practices is possible, even when initial conditions made for a bad mess or worse. Precisely when conditions are unknown, the response may be to impose tougher legal and regulatory mandates to operate reliably, which in turn encourage those skilled at pattern recognition and scenario formulation to come to the fore—particularly those who already work from better practice. We saw some of this after the Lehman bankruptcy. It became an urgent priority to close out Lehman’s trading positions, many of which were very complicated. Yet the transfer of almost all trading positions held by Lehman to other banks proceeded more smoothly than expected. The former head of the New York Federal Reserve, Gerald Corrigan, reported:

First, in line with [earlier recommendations], the dealer community adopted a common methodology for the execution of close-out against a defaulted counterparty. Because this was accomplished prior to the Lehman failure, the extraordinarily complex and delicate close-out process in the Lehman case is being managed with greater certainty and greater safety than would otherwise have been the case, helping to contain systemic risk. (2008)

The closeout was undertaken primarily by LCH.Clearnet, Europe’s largest clearer, which “in the space of just over a week, managed down the main risks associated with the Lehman default without any disruption to the markets and without having to resort to using the clearer’s main default fund” (Grant and Hughes 2008). Similar success was achieved on the U.S. side by the Depository Trust & Clearing Corporation in closing out market participants’ exposure in that country due

to the Lehman collapse (Grant 2008). The result was that “both managed down billions of dollars worth of outstanding Lehman exposures without needing to dip into their default funds” (Grant 2009b). Although complications with the Lehman bankruptcy persist, with other unknowns surfacing, what is important is that the closeouts took place in a context and format where risks could be managed more reliably, even in the uncertainty that follows a panic.⁴

To summarize, our framework expects movements away from macro-design solutions for the financial crisis, and from actual micro operations by individual bankers and investors, to the middle domain. We should expect professionals who work under persisting reliability mandates to move toward operating between system patterns now being recognized across a run of micro operations and toward contingency scenarios now being formulated based on design principles contextualized for local conditions. We can and should anticipate more examples of such practices to surface or reemerge in the future—not just because of, but also in spite of, the flurry of official banking and finance legislation.

Major Types of Bad Mess Management

Managing policy messes poorly when they could be managed better is a mess in which no professional wants or needs to be in. There are many ways to be bad mess managers, and I encourage readers to use figure 3 in chapter 3 to map out how this happens in their own work. Here I focus on three types of bad mess management that are widespread in my reading, observation, and work as a practicing policy analyst: Decisionmakers argue from only one hub or from a single standpoint at that hub; they are just as apt to confuse one hub for another; and they take shortcuts and bypass the unique knowledge and skills of mess and reliability professionals. Creating and managing policy messes in these interrelated ways take place not only in the financial mess, but also in issues as diverse as global climate change, universal human rights, and threats of global pandemics, as we shall see.

The Hub, the Standpoint

The mess in this case is that people treat an issue as if it were centered on and solved in one hub or at a single standpoint. Getting the design right, the numbers right, the right person for the right job, or identifying the right scenario (not to mention asking the right questions) are the seductions of those who want to believe that messes can be cleaned up or avoided altogether. The appeal of starting and stopping with the

micro-level individual or macro-level precept is so commonplace as to be nothing other than the origin and driver of many policy messes. Fixing the mess inside can never be the permanent starting point; fixing the mess outside can never be the permanent end point (Goldie 2012; Peston and Knight 2012).

Sometimes *the* standpoint is rendered as ineluctable logic. If we just had the political will, we would actually [fill in the blank]! The mess, of course, is that we have too much political will, treating every policy as if it were the priority. Sometimes the standpoint is said to be charismatic, worthy of being followed in its own right. How many times have Americans been told that there are over forty million uninsured people in their country, as if that must be the obvious starting point for “cleaning up” the healthcare mess?

More times than not, it is the preoccupation with *the* hub, not just standpoints at it, that makes for poorly managed policy messes. At one extreme is the bad mess management that comes with privileging macro design. We already know we can’t expect Theory to guide everything when it comes to managing mess reliably; what makes things worse is when a specific theory is passed off as able to do just that. The economic sciences provide many fine examples of this.

When rolling electrical blackouts take place, we ask our friends, the economists, why. After a blackout, one of them tells us it was because of all that underinvestment in the transmission grid you get when treating the grid as a public good (see, for example, Heal 2003). During a blackout, another assures us that having to shed load reflects the negative externalities associated with prices’ not fully reflecting electricity’s true cost to consumers, who thus overconsume and overload power lines. Before a blackout, a different economist declares that deregulation will guarantee the reliability we want because it reflects the Efficient Market Hypothesis in operation, where nothing can be better than market prices in reflecting what is known about energy supply and demand, including our willingness to pay for transmission (see, for example, Winston 1998). To which still another economist adds: Whether or not there is a blackout at all, rational expectations theory tells us that policy interventions are hopelessly ineffective anyway (see *Economist* 2006, 68). If we aren’t sufficiently convinced by this point and press our friends about what we should do to prevent blackouts altogether, they tell us not to worry—as long as electricity services are in market equilibrium, with reserve margins optimal, everything is okay. But is that realistic, we ask? Sure it is, they say, that’s what deregulation is all about! But didn’t we fail when we tried to deregulate electricity in California? Quite the contrary, deregulation

wasn't really tried, they counter. But isn't that like saying the Cultural Revolution failed because Madame Mao wasn't really given a chance?

The point here is that very smart and talented economists over a sustained period gave deregulated energy markets—and deregulated financial services—their best shot, and there were still massive unforeseen and undesirable consequences that the participating economists did not predict or forecast. We must never lose sight of the fact that clever people end up in very bad messes when they manage from standpoints huddled around macro design only. Reportedly, the father of the artist Max Ernst once painted a picture of his garden, but he was so upset at having left out his backyard tree for compositional reasons that he cut down the tree to match the picture (Watson 2010, xvii).⁵ I too have cut down my share of trees to fit and frame a policy blueprint.⁶

At the other extreme of macro design are those managing badly because they privilege micro operations as their point of departure and return. We saw some of this in our earlier discussion of street-level workers. Perhaps the best example of this privileging is the importance in policy given to naked personal opinion. Public opinion polls and surveys habitually ask us what our views are on topics about which we have never formed a view. The impulse is to dress up off-the-cuff responses as considered opinion, given that human evolution has made us all quick rationalizers (see, for example, Grigsby and Stevens 2000; Johansson et al. 2005, 119). Lipstick and the proverbial pig come to mind here. Media reports from and regarding the last quarter of 2008—which featured the collapse of Lehman Brothers, the bailout of Freddie Mac and Fannie Mae, and the further bailouts of AIG and Citigroup—are smeared with hyperbole about “herd instincts,” “mob mentality,” “mob rule,” “witch hunting,” “lynching,” “show trials,” and the ubiquitous referencing of “scapegoats” and “scapegoating” (all terms from contemporaneous reports in the *Financial Times*). Whatever was going on in such views of what was happening, it was not analysis about how to manage the financial mess.

None of this is new, and opinions are, to adapt T. S. Eliot's lines from the *Four Quartets*, very much “In the general mess of imprecision of feeling, / Undisciplined squads of emotion.” David Hume called this “the irresistible contagion of opinion” (quoted in Gay 1966, 412). It may not be, as Voltaire thought, that opinions govern the world, but the confusion caused by decisionmakers who operate from opinion—or for that matter from a single standpoint or one hub—in order to get the policy right rather than manage major policy for the messes it necessarily entails is assuredly a deep source of bad mess management in the public and private arenas. However, this is not the only confusion.

Confusion over Hubs, with Special Attention to Prediction

Decisionmakers frequently mistake principles, patterns, scenarios, and experience for each other. The permutations are many, but I focus here on a few that make for especially bad mess management.

Anticipations based on pattern recognition are often confused with specific contingency scenarios. Go back to the mid-2000s, when Gary Becker (2005), the Nobel Prize-winning economist, argued that the performance record of nuclear reactors was by and large positive. That may have been true. But his additional argument that this record constituted a rationale for going ahead and building a reactor somewhere specific is an altogether different matter. Anticipation that a trend will continue based on systemwide generalization is not a localized contingency scenario based on contextualizing a set of design principles. The scenario for *this* locality right *now* with *that* technology and *these* safeguards must first be posed and argued, irrespective of risk assessments grounded in frequency tables across all operating reactors.

Sometimes, the confusion goes the other way, as when local scenario formulation is conflated with systemwide pattern recognition. A number of touted “best practices,” ranging from First World medicine to Third World rural development, confuse a scenario or protocol that works well in one case for the better practices that emerge across a run of cases and that then have to be customized, site by site. As Jerome Groopman puts it for medicine: “What may account for the repeated failure of expert panels to identify and validate ‘best practices’? In large part, the panels made a conceptual error. They did not distinguish between medical practices that can be standardized and not significantly altered by the condition of the individual patient, and those that must be adapted to a particular person” (2010, 13). In this book, I avoid “best practice” (singular) in favor of “better practices” (plural), because neither systemwide patterns nor localized scenarios are stable or decisive enough for a definitive “best” to be realized when it comes to policy messes.

One especially bad form of confusing scenario and pattern has been in post-9/11 risk assessment and management. It’s fair enough that critical infrastructures and businesses should plan and design for the “worst-case scenario” and formulate case-specific emergency protocols when seeking to ensure business continuity in the face of disaster. But that is the contingency-scenario side of the professionals’ domain (figure 3). You cannot ask them to ignore the other side: the pattern

recognition and the anticipations based on observed patterns across many business continuity efforts. To be reliable, professionals also look at the frequency of hazard occurrence and the magnitude of such hazards (Roe and Schulman 2008). Otherwise, they can't differentiate risks that matter to them for the performance modes over which they manage. It is their ability to probe both scenarios, the worst-case ones and others, and multi-case patterns, patent or subtle, that helps them navigate toward reliability—even if that navigation is a matter of determining that what others take to be the worst-case is not worse enough when it comes to scenarios.

Macro design and pattern recognition are also easily confused. The head of Santander, Spain's largest bank, proffered some advice for the financial mess: "Never buy a product you do not understand; don't sell a product you would never buy yourself; and if you don't know some of your customers extremely well, don't lend them money" (quoted in Betts 2008). That may well be sensible, but woe to those who take the advice as stable design principles instead of what may have been at that time better-than-prevailing practices emerging out of dynamic systems.

Pattern recognition appears in each of the preceding types of confusion just discussed. This points to an added confusion. Remember, in our framework, pattern recognition is associated with anticipation; we base expectations and preparations on the patterns observed, when it comes to trying to manage mess reliably. The problem is that the cognitive activity of anticipation is often conflated with prediction, while the other hubs also claim a role in prediction. The result is we have different phenomena passing for prediction without people realizing that they're actually talking about different things—which leads to more mess. How so?

Clearly, macro design can be seen as its own kind of prediction—in this instance, about what will happen if managers follow these principles rather than others. Localized contingency scenarios are also their own sort of prediction, when formulated as worst-case scenarios confronting reliability management. The reactive micro operations of a professional also involve prediction to the extent that the term "reactive" is based on the response that follows the stimulus. All too often these different types of predictions are intermixed, when it might well be better to ask just which type of prediction is at issue. "Even the most intelligent and informed citizen (including lawyers and judges, for that matter) cannot predict with any reasonable assurance whether a wide range of seemingly ordinary activities might be regarded by federal prosecutors as felonies," argues a civil liberties lawyer (Silver-

gate 2009). In this example, are laws ambiguous, which undermines their predictable application, or do the run of actual prosecutions not permit any firm prediction? Is it only that the federal courts have this problem when it comes to what are or are not felonies, or is it that even the best federal prosecutors react differently when it comes to making felony determinations? The mess with respect to felony assignments may not be that we can't predict, but that we're trying to predict all over our management space, as if predicting were one activity only.

To conflate prediction in these ways is an especially acute form of bad mess management and involves far more than the fact that few decisionmakers know what lies ahead beyond the next step. "No one could have predicted the coincidence [of high oil prices, poor harvests, rising food demand, and high biofuel production] that has caused the food price rise," we were told by the director of Friends of the Earth, an organization that had a few years before urged governments to encourage biofuel production (quoted in Harvey 2008). How, then, can these same organizations confidently predict devastation decades ahead if global climate change is not addressed immediately? More to the point, why would we ever believe, let alone anticipate, that they are the ones to manage us out of global climate change, if they can't predict most—some, a few, just one—perfect storm ahead? To be blunt, if people cannot manage reliably just on time or just for now (that is, under conditions of high volatility and variable options), why should we expect them to know now how to reduce volatility just this way or just in case, performance requirements they see as necessary for future sustainability? I return to the wider problems that prediction and the future pose for reliable mess managers in this and later chapters, especially chapter 6.

Suffice it to say that, for a species that cannot anticipate how today's run of events will show up in their dreams tonight, you'd think we would have more humility in using the same brains to jump from this pattern to that anticipation. We would do well to remember that, although some people anticipated the subprime mortgage crisis, most thought the financial mess would start with hedge funds unraveling (see, for example, Kay 2011). Certainly, no one we know predicted the actual sequence of events, in which regulated banks and unregulated investment firms, along with the commercial paper and money markets, would become problems well before hedge funds did.

Shortcut Leaps of Faith

Much of the poor management of policy messes comes from decisionmakers' insistence that reliability is achieved through leaps of faith

from hub to hub that bypass the unique knowledge bases of mess and reliability professionals. Some of the cognitive shortcuts are extremely significant, because they are undertaken all the time and are sure to induce rather than manage a policy mess.

Jumping directly from macro design to micro operations, or the other way around. Set the principle and everything should follow, or so we are often told. Much of U.S. federal regulation of biotechnology, for instance, has operated under that principle of substantial equivalence. This doctrine asserts that no real difference exists between a biotech product and any new plant or food product. The principle is so broad as to make almost any case of biotechnology indistinguishable from any case of a conventional plant or food product (see, for example, Falkner 2007; Riddle 2007).

When someone asserts that each person has the same human rights as every other person, this move goes from a macro-design principle directly to micro operations of personal experience. Those making this leap of faith are then upset when macro principles—such as those in the United Nations’ International Covenant on Economic, Social, and Cultural Rights—are qualified by all manner of country-specific protocols and reservations. The covenant guarantees our rights to education, marriage, and holidays—except, that is, when it is declared to conflict with a country’s constitution, laws, or religion.

From the perspective of this book, such reservations are not hypocritical. Rather, they must be expected if human rights are to be treated reliably. It has been left up to nation-states to enforce universalized values, and the only way we really know that human rights as macro principles are taken seriously is to see how they are applied through context-specific scenarios, contingent according to each country when not to each case. “Thou shall not kill” is all well and good, but we do not know how seriously that principle is treated until we get to grappling with qualifications such as “except in cases of self-defense.” “Granted that I should love my neighbour,” wrote R. H. Tawney, the British economic historian and critic, but “the questions which, under modern conditions of large-scale organization, remain for solution are, ‘Who precisely is my neighbour?’ and, ‘How exactly am I to make my love for him effective in practice?’” (quoted in Caldwell 2008b). To ask “What is the law?” is in effect to add the tacit suffix, “What is the law . . . in *Roe v. Wade* specifically?” or “in *Hamdan v. Rumsfeld* specifically?” and so on (MacCormick 2007, 5).

If rights and values exist only at the macro level, you counter, are we not all at risk as individuals at the micro level? Yes, but not in the way

you may mean. Just because we doubt that human rights actually exist as overarching principles everywhere equally does not stop us from recognizing that we are at risk when systems behave as if those rights did not exist, and there may be better practices to deal with such situations that are modifiable to the context in which we actually find ourselves, here and now.⁷

What mess is involved in leaping from macro to micro directly, and where is the bad mess management in all this? For some people, utilitarianism means that those of us who live above our needs should support those who are perishing as a result of living below their needs, especially when the latter would survive were we to transfer to them the increment above our needs. For the cost of the restaurant meals that I treat myself to every year, I could keep an African child alive. But this leap directly from macro to micro asks me to erase all the other knowledge and information I have beyond a macro-utilitarian ethics or the micro experience of a human being I do not know. I give to my church or the homeless in my town or my family members because I know these people in ways that I do not know that African child. I am, if you will, translating all the knowledge I possess within the networks I operate, rather than ignoring the bulk of that knowledge, when I give money to others. It should go without saying that I may choose to aid an African child, but that would not be because of some half-smart, macro-design principle applied universally to all children regardless of what else I know. (The English essayist William Hazlitt, on seeing Jeremy Bentham—the great expositor of utilitarianism—commented to a friend: “Ah!, that is the great lawgiver, Bentham; a remarkable man: he would make laws for the whole universe, but, as sailors say, ‘he doesn’t allow for the wind’” [quoted in Wu 2008, 153].)

The financial mess itself has been littered with macro-micro leaps of faith that ignore better practices at the pattern-recognition hub or differences between local contexts when it comes to application scenarios of broad policy. To pick one example, a major part of financial-reform efforts has focused on proposals to bring largely unregulated over-the-counter (OTC) derivatives into clearinghouses and exchanges, where there would be greater supervision and regulation. Nonfinancial institutions (for instance, in the food, transportation, and energy sectors) argued against this, as they had long used derivatives as part of their hedging strategies. In the view of nonfinancial institutions, they were being blamed for financial turmoil that had instead been caused by financial institutions in their speculative use of OTC derivatives (Grant, Milne, and van Duyn 2009). A blanket transfer of OTC derivatives to the

exchanges or clearinghouses would, in the view of these nonfinancial institutions, penalize them for something they did not do, while at the same time raise their cost of business without warrant. If so, you would think that before passing a law to require that each derivative transaction take place within a clearinghouse or exchange, someone would be interested in what, if any, were the better practices that had emerged from nonfinancial institutions' use of such derivatives for hedging purposes—if only to ensure that such a new law did not ban what already worked. Yet I have not found one reference to any such investigation in my reading and research.⁸

We see all manner of reverse micro-to-macro metaphysics. A classic move is to base one's social or political ideals on one's deep tacit knowledge. Yet ideals based in individual experience make sense for policy only when scenarios can be formulated and patterns recognized that incorporate and differentiate the experiences, case by case and across cases. How so? For example, the political philosopher Raymond Geuss, argues:

It is not, then, that we proceed as follows: first we have an intuition about “equality” as the basis for political philosophy; then we observe that in this particular case equality is violated (because not everyone is getting “equal” medical care); finally, we infer that we are in the presence of a social evil that needs to be rectified. It is, rather, that there are any number of different reasons for thinking that mass death for want of medical help is a bad thing . . . and we think that in *this* case the reason that so many people are dying is that those who need it are not receiving medical help, not that the treatment is “unequally distributed.” (2008, 80)

Other micro-to-macro moves are prevalent as well. Complex adaptive systems are said to arise autochthonously and nonlinearly out of micro behavior (see Ehrlich and Levin 2005 on the importance of thresholds and phase transitions in “the evolution of norms”). Individuals acting under norms of economic rationality and the cleansing rinse of self-interest are said to spontaneously generate efficient markets; widely chaotic systems are argued to have underlying kernels of determinism. No wonder such thinking leads to even more muddles. “Our default reflex is that the world knows what it is doing, and that is extravagant nonsense,” says Jeremy Grantham, a respected market strategist, about human behavior leading up to the financial mess (quoted in Nocera 2009, B5). Adam Smith, who mentioned the “invisible hand” only three times in his work—and then in dissimilar ways (Rothschild 2001, 116–56)—also described commercial society far more aptly as “the great scramble” (quoted in Porter 2000, 389). Yes, individual micro behavior

can aggregate into patterns we can base empirical generalizations on. Yes, human greed led to patterned behavior that included financial bubbles, and, yes, policy design has a role in addressing them. Yes, bone and muscle have something to do with anatomy and, yes, analysis carves nature better at its joints. But all this sophistry to the effect that what really matters truly reduces to the micro begs the question of who synthesizes the scramble and jumble of patterns and anticipations to manage the messes that arise on a case-by-case basis.

Jumping directly from pattern recognition to macro design, and then to localized scenarios. The move from the systemic patterns to their supposedly direct implications for policy and legislation, and then post-haste to different scenarios or protocols to implement that overarching policy, is extremely popular. We teach our policy students to do this all the time. Its popularity, however, does not make the move any less disabling when we rely on it in our policy messes.

Global temperatures and the world's carbon dioxide emissions are increasing; *therefore* we must have a global strategy to deal with global climate change. To be effective, any such worldwide strategy must *therefore* differentiate and comprehensively deal with the United States and China, if only because those two very different countries together account for most of the emissions, albeit in very different ways (see, for example, Wirth, Gray, and Podesta 2003). There are, however, no “therefores” there.

What is missed in these leaps is the unique knowledge base of mess and reliability professionals in the middle, whose task it is to make sense of the differing scenarios and patterns for the sake of dealing reliably with climate change. What is bypassed is how professionals are actually adapting to a climate change they do not know how to reduce or otherwise mitigate definitively (see, for example, Adger et al. 2005). These professionals include those who are searching for better practices with respect to energy use, here and abroad, and who are familiar with what it would take to translate and modify those practices so they would actually work in the case at hand. In fact, when it comes to global climate change, these managers are increasingly being asked to take the region—not the globe—as the system of interest, and then to determine what regional better practices have to be modified in light of subregional or local differences. The atmospheric scientist Charles Kennel points out:

Regional climate differs in complexity and character from global climate. The factors that combine to drive global climate may have a different balance regionally. Today's global models clearly delineate differences between

the responses of oceans and continents and of high-latitude and tropical zones to climate change. A true regional assessment, however, differs from a regionalized global assessment in its spatial specificity; topography and coastal proximity create local climatic and ecological zones that cannot be resolved by contemporary global models, yet must be evaluated to make a regional impact assessment meaningful. Increasing global models' spatial resolution is helpful but not sufficient; new analytic tools are needed to provide useful regional climate forecasts. Scientists must develop truly regional climate impact models that will help local leaders see what the future holds and understand how actions they can take will make a difference in their region. (2009, 48–49)

Needless to say, even with a specific region denominated as the system of interest, the managers' casting about for better practices will very likely turn interregional at some point. Otherwise, we would expect global climate changes to be managed more poorly than they are.⁹

What is especially troublesome about the direct jumps from patterns to macro design and then to scenarios is how the anticipations based on perceived patterns are articulated and extended to other hubs. Take the numbers 186 and 800. They represent, respectively, the deaths at the time of writing due to avian flu, also known as H5N1 influenza, and SARS, or severe acute respiratory syndrome (in comparison, Hurricane Katrina killed an estimated 1,400 people, while nearly 285,000 people were estimated to have died globally in the 2009 pandemic influenza A [H1N1] epidemic [*Science* 2012, 1626]). Say that by the time you read this, the avian flu and SARS figures are some orders of magnitude higher: Epidemiological and public health models predict up to 300 million and 25 million deaths, respectively, should the viruses lead to pandemics.¹⁰ We again see the move: Take a number, declare it so charismatic that it must be followed, draw out its systemwide implications through global models, and then weave an anticipated crisis narrative out of the concatenated hypotheticals. But what the global crisis narrative about a possible worldwide pandemic should provoke is not an urgent international policy change, but rather the insistent question: Do localized scenarios, such as context-specific contagion models, confirm or reinforce the globalized crisis narrative?

A pandemic crisis narrative is a crisis scenario, and for mess and reliability professionals, scenarios are important for reliability purposes when they are localized around how, in this case, regional scenarios differ from global ones. If the anticipation is that we should be prepared for avian flu to kill up to 300 million people, then the imme-

diate question should be: If we look at regional models involving the H5N1 virus, do we get close to the anticipated 300 million deaths by working from the local or regional scenarios, then across all scenarios, to a worldwide estimate?

When a cluster of family members dies of avian flu somewhere in Asia, the immediate response should not be to conclude that this first and foremost has implications for human-to-human transmission of the H5N1 virus on the global scale (see, for example, McNeil 2008; Rosenthal 2006). Rather, the first-order policy response should be to determine how these deaths fit into a regional (even country) epidemiological model for the spread of avian flu. Thereafter, what are the interregional models for the spread of the contagion, if it starts in Southeast Asia? It is important to recognize from the outset that differences of scientific opinion exist over the incidence of the virus even within countries and regions (see, for example, Zamiska and Pottinger 2005).

Does this mean we need not be worried about avian flu on a global scale? Are we to throw out these global epidemiological models or forecasts? Of course not. The real questions are: Where do we start when we determine what precautions to take—with systemwide patterns and models, or with local and regional scenarios? Do we ask to what extent the contagion models take into account and are based on intraregional and then interregional models of the contagion spread? The answer, in our framework's perspective, is that we have to do both if we want to provide vaccine reliably.¹¹

Just how does leaping directly from pattern recognition to macro design—without first assessing localized contingency scenarios and anticipations based on the recognition of system-level patterns—end up making for more policy messes or making the ones we already have worse? What's really lost if we bypass mess managers, especially when "big picture" issues of design and global trends issue their clarion call? A great deal is lost, and it is worth considering several examples to see how this is so.

Consider three empirical generalizations that are currently popular: (1) megaprojects to construct huge infrastructures, such as dams and major road systems, are habitually underestimated in terms of cost, overestimated in terms of benefits, and undervalued in terms of environmental impacts (see, for example, Flyvbjerg, Bruzelius, and Rothengatter 2003); (2) a project developed incrementally is better than a megaproject implemented all at once or only as originally designed (see, for example, Easterly 2005); and (3) promoting trade is often

better than project aid (see Bhagwati 2002, 2005).¹² Put aside for the moment contrary evidence (see, for example, Sharma 2005) and accept for the purposes of argument their status as generalizations (that is, as mean observations over a wide distribution of observations).¹³

Even if these statements were generalizable for the systems they describe (as I believe they are), they scarcely justify jumping to macro-design principles that assert there should be no more planning for megaprojects; what projects there are should be smaller and incremental; and trade must be preferred over project aid. The three generalizations can in no way be taken to argue against localized scenarios insisting that *in this case* megaprojects and project aid are appropriate, because *here* other things are not equal. The burden of proof, of course, rests with those who argue for such context-deep contingency scenarios in the face of system-level pattern recognition and anticipations to the contrary.

We see another example of taking empirical generalizations as covering principles in the pioneering work of Elinor Ostrom and her colleagues. Ostrom, the late Nobel laureate in economics, found in her review of the literature and case studies eight “design principles” for the management of common pool resource (CPR) institutions (1990, 90ff.). These institutions include a variety of organizational forms—such as grazing associations or groups of community gardeners or forest dwellers—that manage common pool resources with few if any private property rights.¹⁴ Ostrom’s design principles for CPR management entail the institution’s having clearly defined boundaries for the area being managed, including access to graduated sanctions (such as the ability to exclude outsiders) and conflict resolution mechanisms for CPR management. “By ‘design principle,’” Ostrom writes, “I mean an essential element or condition that helps account for the success of these institutions in sustaining the CPRs and gaining the compliance of generation after generation of appropriators to the rules in use” (90). She is quick to point out that the principles should not be thought of as necessary conditions for successful CPR management, though she speculates that future scholarly work will “identify a set of necessary design principles and that such a set will contain the core of what has been identified here” (91).

Assume that Ostrom is correct: More scholarly work confirms that clearly defined boundaries, graduated sanctions, and conflict resolution mechanisms are identified in CPR management systems across a run of many more case studies (for her update, see Ostrom 2005, 258ff.). Such generalized findings in no way constitute design principles, even in her sense. At best they are a set of descriptive regularities that may or may not anticipate better practices.

To be clear, even macro design's second best should not be confused with a system's better practices that surface across a run of cases of micro operations. Every such distribution has its tail cases, and what works best at one particular site may not coincide well with what works best as an empirical average. Such blended knowledge simply cannot be equated to a formal precept or covering principle, even if disaggregated into context-specific protocols. In fact, the permanent gap between pattern recognition and macro design in the framework is quite a healthy one in avoiding bad messes when, as the philosopher Gilbert Ryle observed: "Efficient practice precedes the theory for it" (1949, 30).

From the perspective of the mess and reliability framework, it is possible that CPR management exists at some sites that in no way evince the eight features, however generously scripted. Indeed, for a Third World development that is complex, uncertain, disputed, and unfinished, we would expect there to be different conditions that have yet to be observed in the cases of past and current CPR management reviewed in the scholarly work. If conditions were not that dynamic, there would not be the pressures we continue to observe to modify better CPR management practices in light of emerging conditions elsewhere.

Other leaps of faith across the hubs. Our list of shortcuts to more mess could easily be extended. Here, though, consider an example of an especially mess-inducing leap, as exemplified by the controversy over the No Child Left Behind Act of 2001 in the United States. It is said that implementation of this educational reform has failed some regions and communities (failed local scenarios), *therefore* it has failed children's education at individual schools in those places (failed micro operations), and *therefore* we need to redesign the act or replace it altogether with some other macro policy (see, for example, Dillon 2005).

Yet there are more than fourteen thousand local school boards in the United States (Kraft and Furlong 2004, 283). This too is a very large number, and it means there is very probably a wide range of experience with respect to implementation of the legislation—including that in districts demographically like the ones that have failed. If so, why then would anyone recommend that we change the act to make it work for failed sites and students without first identifying those districts that are similar to the ones that failed, but are doing better—even in the absence of new legislation? Wouldn't we first want to determine if the failed sites could do as well if not better than their counterparts elsewhere, under like conditions? Why would we ignore a higher bar that

many children and teachers have jumped on the promise that overhauling macro design will deliver the right bar everywhere? Avoiding the professional middle in such leaps erases the knowledge we already have and wastes resources, an inefficiency we can ill afford when the reliability stakes are as high as they are in U.S. education.

What If the Bad Mess Is the Management?

Up to this point, my focus has been on bad mess management. However, because mess can be its own form of management, it is important to ask: Are there ways in which these messes manage us?

Janet Tavakoli, the president of a structured finance company, argued—as have many others—that bankers and investors knew that securitized financial instruments were dangerous. These instruments could nonetheless be assembled in ways that facilitated huge gains through short selling (that is, selling a borrowed financial instrument to make a profit by purchasing the instrument at a lower price later and then returning it to its owner). “The risky tranches—those that any investment banker worth their salt knew were write-offs—were used to create other packages that their buddies ‘managed’ in one fund, while shorting in their hedge funds,” Tavakoli maintains (2009). Once the financial mess started signaling that “you’d be a fool not to want to make money this way!,” it ended up managing the traders.

Some observers go further and argue that the financial mess continues to manage us, rather than the other way around. Jeffrey Friedman, the editor of *Critical Review*, insists that bankers and investors reacted rationally to perverse incentives in banking regulations that accreted over the decades preceding the financial meltdown. Worse, such incentives can be expected to persist: Future “regulators will tend to assume that the problem with which they are grappling is a new [induced] ‘excess of capitalism,’ rather than an unintended consequence of an old mistake in the regulation of capitalism. Thus, instead of repealing the old regulation . . . they [will] add a new one, creating fresh possibilities for the process to repeat itself” (2009, 165; see also Meltzer 2010).

If there is good news in any of this, it is that better management of mess later on is not always possible without having first managed or been managed poorly beforehand. Taking risks and failing raises the premium on doing better later. “How can anyone settle for safety when they have never taken a risk?” asked the famous racecar driver Hellé Nice (Mount 2004). The psychologist Daniel Gilbert put it this way: “When we face the pain of rejection, loss, misfortune, and failure, the

... *healthy* psychological immune system strikes a balance that allows us to feel good enough to cope with the situation but bad enough to do something about it” (Gilbert 2006, 177–78). My own view is that having learned to manage a bad mess, say, for example, hunger, and being now able to prevent it from worsening is a good mess to be in, because hunger is something we can actually manage better.¹⁵ For me, the crux of good mess management is avoiding bad mess management. But there is more to good mess management than that, a topic we turn to next.

FIVE

GOOD MESS MANAGEMENT

The question whether it's best to swim with the current or against it seems to me out of date. . . . The method of the yachtsman who tacks with the wind as well as against it seems more fruitful. Such a procedure applied to society demands stoic disbelief and the greatest attentiveness. Anyone who wants to reach even the nearest goal must expect, step by step, a thousand unpredictable variables and cannot put his trust in any of them. —Hans Magnus Enzensberger (1992)

This chapter is longer than others, because it is important to establish how much more can be said about good mess management than conveyed by that casual dismissal: Good messes are transitory, bad messes aren't. My argument here has two parts. First, I summarize the different points we have learned so far about good messes and their management. Then I spend considerable time discussing five major ways to promote good mess management.

The Argument and Implications So Far

If we stay with the framework used in the preceding chapters, what more is involved in managing policy well than avoiding managing it poorly? What more do we need to say than that managing well means you move across performance modes as conditions require with the skills that you need?

As there is much more to say, let's start with the points we now know. When working under conditions that are highly unpredictable or uncontrollable, it is better to manage your options creatively up to the last moment (just on time) than manage reactively with fewer options over prolonged periods (just for now). One way to make conditions more predictable (just this way) is by declaring an emergency, but that course of action has built-in problems as well. We've seen how searching for better practices may be the only viable avenue to reduce the volatility of the task environment in which you work and to increase your options to

respond to that volatility. All this is not without its own risks, but at least they are risks that are known or knowable. Furthermore, as we shall see more fully below, what makes for good mess management is that ability to bounce back from a surprise or shock while planning the next step ahead. Moreover, this resilience-with-anticipation involves learning from the inevitable setbacks to management. It bears repeating that to manage this way means you have to work within a network or networks of like professionals who are skilled in recognizing system-wide patterns, formulating contingency-specific scenarios, and translating patterns and scenarios to achieve reliable services, both at the system and case levels.

If managing messes poorly comes in part from mistaking the hubs and standpoints around them in the mess and reliability space, then managing a policy mess better entails sorting out the standpoints and hubs. We, the mess and reliability professionals, do this to show the many different standpoints and establish why managers are pushed and pulled away from any single one. Is evolution a macro theory or an empirical generalization, or does having to choose push and pull you to more-nuanced positions? Is leadership a micro experience specific to certain individuals, a scenario based on locally contingent leadership principles, or some kind of composite? From time out of mind, the farmer has been central to rural development. But to which hub are we looking when we address better policy for farmers? The farmer we know personally? The risk-averse farmer or the progressive farmer, so loved in theory and project design? The female farmer, given the empirical generalization that many farmers in the developing world are women? Are we talking about “the farmer in Asia” as he or she differs from “the farmer in the American Midwest” who in turn differs from those of other regions and contexts of the world? Because farmers are all this and more, the policy that can tell farmers apart is more effective than the one that homogenizes them together.

Won’t making such differences visibly worsen the mess? Doesn’t the proliferation of and insistence on distinctions make for bad messes rather than good ones? Such a conclusion may itself reflect one scenario or set of patterns, but not the only one. Revealing hitherto obscured elements may change the nature of the mess from bad to good. You would think, for example, that people who are concerned with poverty and inequality would be interested in not only unequal incomes but also more-equal consumption patterns.¹ And you would think that with so much attention being given to relative poverty and inequality—the rest are poorer because the West is richer—there

would be more empirical research on just how, if at all, real Indian farmers or Chinese workers compare themselves to real U.S. farmers or European workers (Panagariya 2003, 1289).

Or return to the major policy mess of having had more than forty million uninsured Americans. This was not as large a group as those without adequate water and sanitation worldwide, but forty million is a big number, with the group including some uninsured people who are better off and others who are worse off than the average uninsured. Doesn't this imply there was a good mess here to be managed—regardless of enacting any official healthcare reform—where those millions of uninsured who were worse off had a variety of things to learn about survival strategies from those millions who were better off but still uninsured? Might it make more sense that we professionals assess these strategies before we leap from the charismatic number of forty million—plus directly to one macro-design “solution” of, say, a bigger or more comprehensive single-payer system?² “If the world is complex and messy, then at least some of the time we’re going to have to give up on simplicities,” argues one mess researcher, John Law (2004, 2).

If the above is correct, then the most important question in a policy and management analysis is not how do we solve this? Instead, networks of reliable mess managers have to ask: What are we missing by way of patterns and scenarios? What are we not seeing that is right in front of us by way of better practice? By asking what we are missing, we also acknowledge our cognitive biases and limitations, and the role of the network in adjusting for them rather than trying to eliminate them once and for all. In fact, when it comes to managing mess well, thinking that you or I can eliminate our own cognitive biases is the cognitive bias that we have to adjust for in management. Ken Fisher, a well-known asset manager, recommended asking yourself the following when considering any investment: “What do you believe that is actually false?”; “What can you fathom that others find unfathomable?”; and “What the heck is my brain doing to blindside me now?” (quoted in Gangahar 2006). This is still good advice.

While I stress the search for better practices, I must be clear that mess and reliability management is also about what is being missed when accounting for how context compels adaptation of principles and precepts in light of local conditions. Another example helps underscore this. Assume that the weight of the evidence indicates unionized firms as compared to nonunionized firms have lower rates of productivity, employment creation, and investment, other things being equal (see, for example, Karabegovic et al. 2004). Contrary evidence exists, as

is the case in any messy pattern recognition, but assume on net that the negative relationship with economic growth holds on average across firms. Even then, professionals must ask of this conclusion: So what? It may be true as far as it goes, but it clearly does not go far enough.

Even if the recognized pattern is as stated, localized scenarios in which the opposite holds are possible. For example, considerable evidence suggests that the “union/nonunion” dichotomy masks great variability in collective bargaining laws and wage arrangements across countries and regions (Aidt and Tzannatos 2008; Boeri, Brugiavini, and Calmfors 2001). That variability, in turn, suggests we take another look at the macro-design standpoints to which this local variability is a response when it comes to the union/nonunion dichotomy. What human rights, for instance, are at issue when one talks about unionization? In reviewing the literature, one quickly realizes that the rights concerned relate not to any “right to unionization” but to the more traditional ones of collective bargaining and freedom of association (see Aidt and Tzannatos 2002). Taking the latter as the point of departure brings to the surface two issues that may well have been missed by others. First, focusing on different rights means the prior focus on unionization and economic growth at the pattern recognition hub is too narrow. We should instead be looking at the evidence related to growth and collective bargaining arrangements generally. Second, if we did that, we would better understand why local conditions are so variable with respect to “unions” now variously defined.

Last, by way of summarizing the implications of the argument so far, asking what you and your network are not seeing in the policy mess means you have to reflect on what matters for management. Not only is it too easy to confuse a mess for a problem or a crisis, but we are also apt to confuse our definition of the problem for the problem itself. Then we wonder why trying to solve the problem definition ends up producing a really bad mess.³ “We had the wrong assumptions and therefore we had the wrong plan to put into play,” concludes a U.S. Army general of the planning mess for the post-2003 occupation of Iraq (quoted in Gordon 2008).

We can, however, do much more by way of nurturing, expanding, and protecting good mess management for better policy than the above insights suggest. I turn now to five major ways to do so, along with some of their specifics: recognize and protect mess and reliability professionals; be your own mess and reliability professional; join disciplines that are becoming real-time professions; favor networked deci-

sionmaking over problem-centered approaches; and manage setbacks better. These interventions are neglected when they should be championed, especially in light of the societal challenges in the next chapter.

Recognize and Protect Mess and Reliability Professionals

As our goal is managing well rather than poorly, we must protect those professionals who do manage well. By protect, I mean that these middle-level managers and networks need not only to be defended, but also shielded and buffered from the wider volatility around them. These professionals are under threat from economists who see them as rent-seeking bureaucrats; business faddists who see middle-level management as ripe for reengineering; and politicians who revile both regulation and regulators but who nonetheless demand all kinds of real-time protections to safeguard them from all manner of risk. There is also that “us” whom reliability professionals need protection from, because the more we-the-public know about how many close calls and near misses are involved in order to keep our services reliable, the more we—as consumers and citizens—demand high standards of performance whose invariance would undermine that reliability even further.

But why should we protect professionals who take reliability seriously? Because, without them, all those glitches that are already happening in our complex technical and service systems would turn into major accidents and failures. The net present value of savings that these managers and operators achieve every day across the world must be in the billions of dollars. Depending on whom you ask, the ratio of near misses to actual failures in our critical infrastructures ranges between 1,000 and 100 to 1 (Robert Bea, personal communication). Imagine what that number would be if no one were converting the near misses into close calls and actual saves.

If mess and reliability professionals are not protected, who would buffer society from actions based on risk management models that fail to predict events that actually happen, or fail to provide scenarios about what to do once the possible improbably does happen? Networks of such professionals are to be protected in major part because of their dual ability to assess the probable (what is likely to happen in light of the systemwide patterns observed) as well as the possible (what can happen by way of scenarios given a constellation of contingencies, few of which may have been encountered before).

Start with the probable. While the conventional definition of risk is

the product of the magnitude of a hazard and the hazard's probability of occurrence, as we saw earlier, this is only a point of departure to understanding risk from the perspective of mess and reliability. From the other side, the development of worst-case scenarios—especially when it involves thinking about what has not happened before—is another conventional way to approach risk. To reiterate, these two common views of risk represent the respective bookends of pattern recognition and scenario formulation. In between is where mess managers and professionals undertake the hard work of interpreting and differentiating these risks in the name and under the discipline of reliability-seeking management. It is in that hard work where the skills of recognizing and formulating possibilities are also honed, as mess managers move across performance modes and the specific risks entailed in managing there.

While it is more familiar now to distinguish thinking about the possible from estimating the probable (see, for example, Hirschman 1970, 343), for professionals in the middle these activities are reciprocal. Thinking about the possible is one way professionals manage within a domain where system-based inferences and context-specific deductions must be connected. To translate the patterns you see and the scenarios you formulate so as to ensure reliable performance is also to validate the possibility that you may have to add to, let alone revise, your repertoires of patterns and scenarios. How so?

At the end of October 2007, during the firestorms then affecting San Diego, I was in the control room of the California Independent System Operator, which manages the state's electricity grid. Engineers and support staff were huddled around the shift supervisor's conference phone as he talked to his counterparts in San Diego and elsewhere. At one point, a San Diego control room operator said something like, "The two lines relayed [went out of service] this morning, and that could happen again this afternoon." This immediately sent the engineers and staff to their grid maps to figure out what such relays would mean in terms of shifting the load later that day.

What is important about the episode is that the two lines went out of service that morning in a way that had not been seen before, as far as I could determine. While fires are a feature of the San Diego region, the operators hadn't seen this kind of event in that way. For them, this one instance of relaying was enough to prove the truth of the statement, "It could happen again." If it happened in the morning, it could happen in the afternoon. This if-then statement was not a conditional probability—that is, a statement of what was *likely* to happen, given

what had occurred. Probability in that sense requires a run of cases, yet the defining feature of the episode was that the professionals involved had never experienced this type of problem in that set of circumstances. Something had to be done, because harm to the electricity supply was entirely possible.⁴ Not just a scenario or—I concluded as I listened—even a worst-case scenario, the relaying was a live possibility as real as if the operators could have put odds on it happening.

We expect the professionals who provide critical services—again, not just in control rooms—to move beyond pattern recognition of risk and worst-case scenarios and manage in the face of the inevitable surprises that contingencies bring. As Maynard Keynes famously quipped, “The inevitable never happens. It is the unexpected, always.” We want professionals in their domain to navigate between the best that is possible enough for them to anticipate (prepare for), given the system and local scenario they confront, and the worst that is impossible for them to dismiss, given the same system and scenarios (see, for example, dos Anjos and Chick 1995, 257). In these circumstances, having to make a decision becomes even more difficult to avoid because both probability and possibility are evident to managers. The sensitivity of professionals to such distinctions, I believe, comes from their ability to differentiate and appraise risk—the probabilities and hazards and scenarios—under shifting performance conditions. They have learned the importance of possibility because no amount of retrospective success in management prevents the manifest possibility—not just probability—of future failure (Roe and Schulman 2008). In a policy and management world where decisionmakers reel from what was just inconceivable to what now seems inevitable, it is essential to have and protect good managers who don’t skip a step in between and who take seriously both multiple possibilities and multiple risks.

How would the protection of the mess and reliability professionals proceed for those involved in the financial mess? There certainly is the need to protect that dog that hasn’t barked—yet. From this book’s vantage point (chapter 2), the most important priority would be for the government and regulators to protect the professionals managing our other critical infrastructures, particularly electricity and telecoms, from any cascading contagion in banking and finance. If they are not protected—and presumably infrastructure protection is the good mess in “protectionism”—we potentially face a socioeconomic crisis more dangerous than the one after late 2008.⁵ Why? Because the Great Recession has left us with fewer options and more volatility for governments than before it, and some critical infrastructures are already

operating close to their respective performance edges. If luck is when skill meets opportunity, then many infrastructures may be running out of luck, and we along with them.

We should also be protecting those professionals within banking and finance. The entire sector did not melt down—to use our terminology, not all its mess and reliability professionals were pulled out of their domain of competence into unstudied conditions. “Contrary to popular perception,” writes Gillian Tett of the *Financial Times*, “by historical standards, most of the financial world was *not* crazily leveraged in the past decade. Instead, the crazy debt increase was focused on a small group of brokers, and global banks” (2010). The banking and financial sector was never in pervasive crisis globally or regionally. The United States needed to look no further than next door, where a headline said “Canada banks prove envy of the world” (Mason and Simon 2009; see also Flaherty 2008). Since not all banks and investment firms, in the United States or abroad, weathered the financial mess in the same way with the same effect, how similar banks were able to avoid disaster should be of keen interest to managers, a point to which we return throughout this book.⁶

Some financial firms all along refused to involve themselves in mortgage-backed securities or did not require bailout funds (see, for example, Cohan 2009). One observer put it: “We should also recall that not all public banks have behaved badly. For every Credit Lyonnaise there is a BNP, which did a respectable job when state-owned” (Jackson 2008; Jolly 2012; on reliability in U.S. equity markets during the financial upheaval, see Greifeld 2009).⁷ European-based banks also varied in terms of their performance (on the comparative success of Santander in Spain, see Mallet 2009). “Unlike so much of the financial system, the mutual fund industry came through this crisis unscathed,” argue Niall Ferguson and Laurence Kotlikoff (2009). But, you ask, how long can that continue? My point, precisely. If the first priority is to protect those mess and reliability professionals in other, interconnected infrastructures, then the second priority must assuredly be to protect those that remain within finance itself.

Protecting professionals means protecting their networks. A number of financial reform proposals have called for good bank–bad bank mechanisms that would fence toxic assets off from viable ones (see Blinder 2009; Jenkins and Johnson 2012; Sidel 2009). It is by no means clear, however, how one improves reliability by breaking up networks of competent managers and then expecting the segments to be reliable once they are reassembled into banks with good assets and other

banks with bad assets. Both types of banks require active management, and they may well operate in the same global markets—yet the two types may well require very different kinds of managers. “Bankers want to keep customers. That’s how they define success,” according to the head of the Swedish central bank, based on Sweden’s own experience with this kind of arrangement. “If you’re running a ‘bad bank,’ success is to get rid of your customers—and that means you have to have a different mindset” (quoted in Thal Larsen and Giles 2009). Such cognitive flips, as we shall seem, create considerable challenges ahead.

Be Your Own Mess and Reliability Professional

Reading this book makes you more than a student of mess and reliability. A good number of you are already professionals—if only because the only reliable manager any individual has in the healthcare mess is him- or herself.⁸ The modern corporation has outsourced to you not just your healthcare management but also other operational responsibilities, be it your banking through ATMs or your tracking of your own packages online (see Alvin Toffler in Gardels 2006). Many of you are already networked into several other professional domains. So far, my left eye has been operated on, well, let’s not count the number of times, so it now exists within an extended network of ophthalmologists, glaucoma specialists, eye surgeons, and more—a network I belong to only because the eyeball in question happens to be in my body.

Many readers work in organizations or sociotechnical systems that consider their services to be critical and for which reliability is a mandate or part of their mission. To that end, you spend a good deal of time caught between balancing the immediate past with the next step ahead. This defines “real time” for many of us: a past that isn’t yet over and a future that has already started, leaving the present mess in between to be managed. In contrast to what some studies have found, that people exhibit “an *excessive* preference for the present” (Offer 2006, 72), the professionals we are talking about exhibit a *justifiable* preference for real time.

I think of my own profession in these terms. Policy analysts and public managers are mess and reliability professionals charged with making sense of the wider patterns and local contingency scenarios they face, case by case and often just on time. They are caught up in the middle of things, where it’s easier for them to say we’re in a policy mess than to tell the story about how it began or will end (see Beer 1983; Roe

1994, 2007). At their best, analysts and managers identify and sort out the standpoints they confront around the four hubs of macro, micro, pattern, and scenario, with an eye to rummaging out the good mess from the rest when it counts the most—for this step and the next one ahead. To do so means that analysts and managers are occasionally pushed and pulled to think in terms of careers rather than solely in terms of the immediate tasks, because no one job can provide the unique knowledge and experience required for real-time management.

One way to become such a professional is to use the mess and reliability space in chapter 3's figure 3 as a diagnostic in one's own practice. Next time you are in a meeting about some policy mess, map the positions you are hearing. If experience is any guide, you will find that the participants feel compelled to map out all the hubs and major standpoints around them before some of them are pushed from their viewpoints and pulled to translating what all of this means for the case at hand. After a time, someone finally asks, "Just what does all this mean for what we should be doing?" Then you can answer with your own question: "I wonder what other people in your situation have done that actually worked?" This is why there is great virtue in the practice of trying to "bring the system into the room," so that comments of stakeholders around the hubs driving the policy mess actually map the entire mess and reliability space. In these ways, you're muddling through, but you aren't muddle-headed. All this seems horribly counterintuitive to those who want to gloss over differences so as to "get to the point," albeit the point they get us to is more mess.

As with brainstorming, the point of mapping the mess and reliability space for the policy issue is not to rush the talk by leaving out important standpoints. Otherwise you and others risk not being pushed and pulled to the mess that can be managed. It is in this middle where the heavy lifting and balancing of that barbell with patterned anticipations at one end and formulated contingency scenarios at the other has to take place. Think of plotting and populating the hubs as the way you can get to a position where everyone uses a constantly updated reference list of what has worked elsewhere and more effectively.

A critical part of becoming a mess and reliability professional is an appreciation of the dangers inherent in both prolonged just-for-now performance and operating outside of the competence and skills in any of your networks. Mandating more for less, and then even more for even less, is the surest prescription for backing managers into a corner, forcing them to manage to the edge of failure while task volatility remains high and options progressively fewer. But no manager believes

professionalism lies in failing to fail. Prolonged just-for-now performance, as we saw, is sure to deprofessionalize operators, and that includes you. It is true that some features of just-in-time manufacturing are now treated pejoratively (see, for example, Lynn 2005), but the just-on-time performance discussed in this book is different. A particularly salutary feature of just-on-time performance, from a professional standpoint, is the search for alternative ways to assemble options even when task volatility is high.⁹ It has been suggested that “one of the strongest safeguards against cognitive errors” is “to generate a short list of alternatives” (Groopman 2007, 66; see also Marcus 2008, 165). While professionals cannot eliminate their cognitive limits,¹⁰ adjusting for them is one of the few things that professionals and teams networked together are able to do, and do well (see, for example, G. Klein 2009, 63; Sorensen 1992, 256–66).

Note that for just-on-time professionals the greatest danger is not the lack of deliberation or analysis, although you will often be told otherwise (see Sunstein 2007). It scarcely suffices to urge you to take time and plan better, when conditions push and pull you differently in the midst of an inescapable urgency. “Be deliberative!” or “Think through the worse-case scenarios!” is a good macro principle as long as you remind yourself of those cases in which deliberation had consequences that differed little from those well-documented instances of groupthink, escalation, and entrapment in decisionmaking (see, for example, Drummond 2001). “Contrary to conventional wisdom,” concludes a *Science* article on deliberating about complex matters, “it is not always advantageous to engage in thorough conscious deliberation before choosing” (Dijksterhuis et al. 2006, 1005). “Thinking Too Much: How Introspection Can Reduce the Quality of Preferences and Decisions” is the title of a well-known article from the field of social psychology (T. Wilson and Schooler 1991). Better to rely on training our gut feelings and intuition, concludes the well-known psychologist Gerd Gigerenzer (2007; see also G. Klein 2009).¹¹ Yes, of course, there are problems with just-on-time performance; as we saw, it risks misjudgment. Yes, the downside is that rapid adaptation is purchased at the cost of discouraging second thoughts before acting (see Schlesinger 1997, 7).

Yet Mintzberg (1973) demonstrated long ago that managerial work almost always involves tough decisions under severe time constraints, with incomplete information and in high-paced environments. Scholars may aspire to completeness (see, for example, Nuttal 2003), but analysts and managers are all about being timely without being definitive. If politicians have to fight to get heard and be taken seriously—

and if when they succeed, it is only at the last minute, with but a vote to spare, and then only after a great deal of very hard work—why should things be different for the analyst and manager? Rather than recommending “more deliberation” as the best solution—a mess-inducing single standpoint, if there ever was one—wouldn’t it be better to find out how real-time mess managers achieve reliability in the ways they do and their practices in doing so?

Join Disciplines That Are Becoming Real-Time Professions

A forgotten thread of diplomatic folklore suggested that when the new Kingdom of Belgium emerged in 1831—much to the annoyance of the Congress Powers who had imposed the Vienna settlement on Europe after 1815—there had been a demarcation error at the point where the borders of Belgium, Germany and the Netherlands met. Somewhere between Aachen and Verviers, there existed a tiny triangular space, big enough to contain a house, a patch of field and a few fruit trees, which belonged to nobody.—Neal Ascherson (2001, 8)

Disciplines and professions are also just like that: Their demarcators lay down formal boundaries, while those operating locally find things aren’t as sharp on the ground as they are on paper. In fact, the interstices, though not officially recognized, sometimes provide just enough room for those in the field to work well.

Professionals thrive in such spaces, and I can think of no better way to protect, let alone become, a mess and reliability professional than by working in real-time professions not (yet) recognized by their counterpart mainline disciplines. Of course, a few professions have always been real time. “Foreign policy,” a former U.S. Secretary of State, Dean Acheson, said, “is one damn thing after another.” Hospital emergency rooms and incident command centers are familiar examples of real-time mess management when life and death are at stake. Other disciplines and fields are in different stages of emergence when it comes to their real-time professions, and these evolving areas of knowledge are their own training grounds for mess and reliability professionals. Here I discuss two emerging fields of interest: real-time ecology, which I discuss briefly, and real-time economics, which I discuss at length. It turns out that understanding real-time economics better—if only to acknowledge the field’s existence and practices—provides important insight into the financial mess and better mess management.

Real-Time Ecology

What has been called “real-time ecology” are the patterns, scenarios, and knowledge of ecologists (writ broadly) involved in the day-to-day, if not hour-to-hour, operation of large water and hydropower supplies (Roe 2004). The involvement of these ecologists arises out of legislative and regulatory mandates for the protection of endangered species and habitats as well as for the safety and reliability of water supplies. The knowledge generation and transfer in this field typically take place when ecologists advise and interact with infrastructure operators. That ecological advice, in my experience, can be based on ecologists’ case-specific analyses, their anticipations founded on patterns perceived across a run of (often patchy) cases, and their localized contingency scenarios for cases that have not yet occurred but might well—all frequently applied “just on time” for management or regulation purposes.

What does that entail? The control room operator asks the ecologist: What do I do now? Do I open that gate and save the endangered species, or close it and dry out the already endangered habitat? Do I shut down the pump to save the Delta smelt, even if I would risk violating urban water-quality standards in the process? Do I bring online that old generator to keep the lights going, but increase air pollution at the same time? What do you, the staff scientist, recommend I do, right now when it matters? (van Eeten and Roe 2002). Answers to such questions contribute to its own “ecological” knowledge base, albeit one not currently recognized or utilized by many ecologists outside that domain of competence. It may seem that I am suggesting that control room operators of society’s critical infrastructures could be better positioned to manage the environment than even our most talented research scientists operating independently of our infrastructures. You bet I am.

Much of academically based ecology is driven by theory and research more than it is by better management practices emerging nationally and internationally across often very different ecosystem management programs and projects. In fact, a great deal of what passes for management in ecology has been theory-based, scientifically sanctioned “adaptive management” whose baseline is not existing better practice by real-world resource managers but rather the null hypothesis that little scientifically sanctioned “evidence-based” practice yet exists. Much of the real-time ecology advice described above is summarily dismissed by university researchers as “agency science.” Still,

the drive to move away from macro-design theories of ecological management is a feature of ecology as a real-time discipline that is growing and will continue to do so (for more on these issues, see Roe 2011).

Real-Time Economics

Doubtless, histories of the financial meltdown will continue to give prominence to the disabling role played by the macro-to-micro shortcuts of finance theory, risk modeling, and economic assumptions about individual investor behavior (see, for example, Alloway 2012; S. Patterson 2010). Here I want to highlight not just the importance of the middle-level professionals who were not so deluded, but also the underreported field to which they have been contributing: real-time economics.¹²

This emerging field differs considerably from what is taught in textbook economics. Put yourself in the middle of the financial sector looking out to the extremes of the mess and reliability space where the economic sciences are said to hold sway. Off in the distance, the real-time economist glimpses not one economic theory but many at the macro-design hub of his or her cognitive space for economic reliability. Neoclassical economics says it is a Good Thing when competitive markets are in equilibrium; Austrian economics says it can be a Very Good Thing when competitive markets are in disequilibrium (see, for example, Littlechild 2002, 7–16). Of course, there are business cycles; of course, prices go up and down. But no real-time professional expects those matters to be decided at the level of deductive principles in a textbook. Of course, it would be a consolation for middle-level professionals to know if they were on the upside or downside of a credit cycle, but they could never depend solely on knowing that to produce real-time reliability for economic and financial services. After a point, the seriatim laws of economics—Pareto’s law of unchangeable inequality of income, the iron law that wages never fall below subsistence levels in the long run, Say’s law that supply creates its own demand, Marx’s law of the falling rate of profit, Keynes’s consumption function based on a “psychological law” (see, for example, Pizano 2009, 52)—do no more than flare on the horizon as if dropping from another planet.

The far reach of distance also comes into view when the real-time economic professional looks to the horizon in the opposite direction, to the lower right-hand corner of the mess and reliability space where micro operations thrive. There some would have us believe economic agents operate individually at the micro level, each with his or her own animal spirits and risk appetite. One agent responds in a risk-averse

way when facing uncertainty; another one acts in an imitative fashion under the very same conditions, which may be risk-taking depending on whom he or she is imitating (Roe 1998). Neuroscientists and behavioral economists are tracking all manner of splotches in functional magnetic resonance imaging brain scans in order to understand just such micro decisionmaking (Tallis 2008).

Much closer to home for real-time economists and finance managers are the systemwide patterns and localized scenarios they must synthesize if their respective services are to be reliable in the present. The real-time professional cannot expect one economic theory or micro behavior to hold across all cases and contexts, including the one he or she faces right now and in the networks they find themselves. Chetty, real-time economists know, is not Shanghai, and markets vary accordingly. Sadly, the situation differs for their academic counterparts, who “have moved steadily away from seeing location as a determinant of human experience. Indeed, economic progress [for them] is seen as a release from location’s grip,” writes Partha Dasgupta, a professor of economics at Cambridge University (2005).

The real-time economists’ search is for better practices minus the illusions—particularly the illusion that better-practice economics approximates textbook economics (see, for example, Kaplan 2011). In fact, real-time economics can be thought of as better-practice economics that has had to move well beyond the Economic Theory of the day and the Horatio Alger stories of Today’s Model Entrepreneur.¹³ As an example, debate heats up from time to time between proponents of a principles-based form of regulation and accounting and those who favor more specified rules and procedures (see, for example, Wallison 2007). At one point, Europeans preferred broad principles under which “light-touch” regulation took place, while the United States favored less discretionary and more formal enforcement of specific rules and regulations. At first glance, the empirics seem to be a contrast between light-touch regulation encouraging light-fingered corruption versus formal regulation becoming murder by overregulation. At second glance, the difference would seem to be between a macro-design approach grounded in principles and a localized-scenario approach based on regulatory protocols applied to specific and varying cases at hand. But real-time economists understand that the controversy has often been one revolving around systemwide pattern recognition and anticipations—in other words, an attempt to determine better-than-prevailing practices with respect to regulation and accounting, be those new practices principle-based, rule-based, or, as turned out to be the case, some hybrid version (see

Duffie and Hu 2008; for postcrisis changes in positions, see A. Hill and Leahy 2009; Thal Larsen 2009). Certainly the financial mess has fueled the search for regulation that works for really existing entrepreneurs. John Mack, the head of Morgan Stanley, is reported to have said in one of his more candid moments in 2009 that “regulators have to be much more involved,” adding “we cannot control ourselves” (quoted in Sorkin 2010).

Where are the real-time economists? Some examples are a network of fourteen of the largest credit derivative dealers who, with their staff, worked through an early backlog of over-the-counter transactions; bankers at the Bank of International Settlements’ Financial Stability Forum, who meet bimonthly; and the staff of the same bank who worked on the Basel capital security accords (see, for example, Geithner, McCarthy, and Nazareth 2006; Tett 2007b).¹⁴ If contemporary media accounts are correct, histories of the financial mess will find it difficult to separate Henry Paulson and Timothy Geithner from their networks, so frequently was each Secretary of the Treasury on the phone (Anderson 2007; Solomon and Paletta 2009; Tett 2008a). There are later examples of wider networks at work: “Back in the summer of 2011, when U.S. default loomed, the senior managers in the largest banks spoke extensively with each other about their preparations. They then communicated these collaborative moves in extensive detail to the U.S. Treasury, the Federal Reserve and other regulators” (Tett 2012). By and large, though, the real-time economic professionals are little researched or understood. It thus bears repeating that these middle-level staff and specialists are those who make the out-of-sight “plumbing” of the financial infrastructure work (see, for example, Grant 2011a). Those responsible for “clearing . . . ‘the essential plumbing’ that underpins equities, derivatives and bond trading,” for example, have this know-how (Grant 2011b). This is not quite Keynes’s idea of economists as dentists, but it’s close enough when the practices that work are thrown in. When described, these professionals are often defined by the experience they have had with highly volatile situations. “In any market that is volatile, previous experience helps a tremendous amount,” reported the head of one European commodity derivatives unit. “Traders who are experienced are less inclined to panic, and keep their discipline because they have seen it before. It’s not a shock to the system. If you’ve been in a car crash once, then you know what to expect” (quoted in Oakley, Mackintosh, and Gangahar 2008). “The supervision of major financial institutions requires deep skills in credit, deep skills in risk analysis techniques and it requires within that organization very skilled, trained professional people,” counsels Henry Kaufman, a respected Wall

Street economist, based on his own long career (quoted in van Duyn 2008). While the theory is that a firm depends on the transactions of buyers and sellers who are price-taking, context-free (so-called methodological) individuals in markets that would not exist without them, real-time managers find themselves facing highly context-dependent transactions that would not take place in the absence of reliably managing the underlying infrastructures for markets.

Quite clearly, the financial mess tested the limits of knowledge of even the best of those economists, who were adept at working under pressing time constraints and heightened reliability mandates.¹⁵ For example, initial improvements in financial modeling arising from the mess fell short of ensuring the pattern recognition needed to avoid just-for-now quick fixes by finance professionals. At one point, the Basel Committee on Banking Supervision proposed guidelines for improving risk calculations related to the structured financial instruments that were on the trading books of large banks. The committee admitted, however, that factors connected to foreign exchange and commodity prices that might “create large trading losses if they are not managed effectively” were excluded from the guidelines. Why? Because even the proposed guidelines on their own went “well beyond the current state of risk modelling at most banks” (Basel Committee on Banking Supervision 2008, 4). Nor did “questions about the reliability of the [risk] models” diminish later on (Masters 2012b).

It is all well and good to call for transparent financial instruments, more savvy investors, and greater attention to moral hazard, but the fact remains that the new financial instruments were and are still too complicated to be transparent (see Tabb 2007). For real-time economists, the global financial system is patently complex; calls for greater transparency only serve to demonstrate that others find it next to impossible to get the “big picture” of the system. Paul Samuelson summed it up neatly: “What makes this meltdown different is that we have built such an elaborate house of cards on the fiendish financial schemes of ‘brilliant’ MIT and Wharton School graduates that it will take a great deal of time to unwind the mess and rebuild confidence in the financial system” (2009, 43).

This is why readers, let alone the economics profession, need to know more about this emerging field of real-time economics, the skills of its practitioners, and the better practices to be relied upon. Otherwise, the conventional economics we have hitherto relied on risks remaining in the same cognitive mess that it has been in for decades. Friedrich von Hayek put it early and best in his speech accepting the

Nobel Prize: “We [economists] have indeed at the moment little cause for pride: as a profession we have made a mess of things. . . . What looks superficially like the most scientific procedure is often the most unscientific, and, beyond this, that in these fields [including economics] there are definite limits to what we can expect science to achieve” (1974).

Favor Networked Decisionmaking

What should you do if you cannot find a real-time version of your field or discipline? Join a network of professionals within which to work, for you will never be able to manage policy messes well on your own. This applies to those in economics as well in finance and banking.¹⁶

Substantial work has been done on network-based decisionmaking and how it differs from conventional problem-centered decisionmaking.¹⁷ Much of the literature on the latter reverberates with macro-design approaches to operations, while the literature on network-based decisionmaking is more closely aligned to the domain of mess and reliability professionals. The contrast between the two approaches—here too, little is hard and fast—is summarized in table 2. Both decisionmaking approaches start in dynamic conditions, and both recognized that the more turbulent the conditions, the greater the emphasis in decisionmaking on managing reliably. For the problem-centered approach, the best response to conditions is to ensure that problems and goals are well defined before management starts. If the problem is ill structured, then define it so that it can be addressed in the presence of clear goals and objectives that drive the problem solving. The approach starts with the problem’s dynamic features, including uncertainty about their substance, and the role of problem definition and goal specification is to stabilize the assumptions needed for resolving the problem. The temptation, of course, has been to resort to only macro principles as the best way to stabilize those assumptions.

The network-centered approach responds to the dynamics differently. The driver here is the sense of urgency that a decision needs to be made now or very soon and that management must proceed as quickly but reliably as possible. For instance, a major setback has just occurred, rendering the issue of management even more urgent (this is one sense in which things have to get worse for them to get better). Network participants and stakeholders know that some kind of intervention has to be made, but the rest remains fuzzy. Decisionmakers

Table 2. Two decisionmaking approaches in dynamic environments

<i>Problem-centered</i>	<i>Network-centered</i>
Problem exists for problem solvers	Sense of urgency exists for networked decisionmakers and managers to intervene
Define problem for analysis	Define rules of the game for decisionmaking within the professional network (for example, procedures and processes)
Clearly defined goal of analysis is formulated prior to problem solving	Formulating the goal within management network is an ongoing process
Information, including design and research, exists for analysis	Knowledge is negotiated in the process of synthesizing information and research about better practices by networked professionals
Decision follows from problem, goal, and information and brings closure	After decision, another round of negotiations follows, with possible new opportunities as network comes to understand changes and reconfigures itself
Lock it up!	Keep options open!
Analysis → synthesis → action	Action → synthesis → analysis
Problem solving is effective when implementation achieves the goal defined earlier	Network decisionmaking is effective when information that has been gathered is used, including emerging better practices

Source: Adapted from de Bruijn and ten Heuvelhof 2000

and managers end up formulating their goals as they go along. What network professionals are doing may become clear to them only along the way. In this manner, a “solution” may make visible for the first time the real “problem” that ends up being managed. Such learning is never guaranteed, however, and professionals may only be able to

agree on the rules of the game for making decisions and undertaking management interventions in light of the dynamic conditions.

Within problem-centered decisionmaking, just as a problem exists to be solved, so too do the information and approaches for solving it. The data and tactics may not be identified beforehand, but they are out there to be researched, found, and analyzed. In network-centered decisionmaking, information is also collected, but its importance—the knowledge it conveys—is negotiated by those in the network. Deciding what is to be gathered by way of information ends up being the way knowledge is managed for use. The search for information about better practices, for instance, produces its best results when the network converts the knowledge it gains into better management.

For problem-centered decisionmaking, once the analysis has been done and the big picture made clearer, the results are synthesized into recommendations. If this is the problem and that is what the evidence and its analysis show, then decisionmakers would be irresponsible not to “lock in” the conclusions to be drawn. Not so for network-centered decisionmaking. No decision is explicable solely in terms of where the professionals started from, because changes in course are open to renegotiation in light of new possibilities and emerging goals. In particular, what works by way of “best” practices is always evolving. The overall drive in decisionmaking is to keep options open in the midst of contingency—or, better yet, to create options as you go along. “The best way to predict the future,” said the computer scientist Alan Kay, “is to invent it.”

In sum, the problem-centered approach revolves around articulating goals, analyzing problems, and synthesizing results: You make a decision and take action based on the results of analysis. In network-centered decisionmaking, a sense of urgency compels networked professionals to take action by coming together and synthesizing what they can know and decide. The analysis and definition of the issue, the goals to be pursued, and the knowledge on which they make their management decisions all come out of the negotiated synthesis. In one approach, the solution follows from a clear problem statement; in the other, what the “problem” was or is becomes clear after probing a number of possible interventions. In one, analysis leads to synthesis and then action; in the other, action leads to synthesis and then to analysis, although “synthesis” and “analysis” differ in the two approaches. One seeks to fix the mess and get out of it; the other finds the mess that can be better managed and tolerated. Effectiveness for problem-centered decisionmaking is measured by how well results conform to the original goals; effectiveness for network-based deci-

sionmaking is measured by how well better practices can be modified locally in useful ways, as goals and options evolve over time for the networked professionals.

The two approaches can occur together with variations. Let's think again about a traffic mess. As traffic becomes congested, more signage goes up to sort the traffic out. At some point, an awful accident occurs, which brings urgency to rethinking the mess that the traffic and signage now pose. In a well-known Dutch example, a traffic engineer and community members embarked on a process that led to taking down traffic signs. This created a new mess that led drivers and pedestrians to proceed more cautiously, thereby reducing the overall accident rate: "Without bumps or flashing warning signs, drivers slowed. . . . Rather than clarity and segregation, [the traffic engineer] had created confusion and ambiguity. Unsure of what space belonged to them, drivers became more accommodating" (Vanderbilt 2008, 30). No one, of course, should expect this new mess to last forever.

The decisionmaking differences between the two approaches are profound for policy and management. In a world where reliability-seeking professionals are pushed and pulled to work together, policy formulation—as researchers have long insisted (see M. Hill and Hupe 2002, 77–79)—is much more a species of process and network management than macro-design approaches to problem solutions would lead us to believe. Leadership is about managing within a network rather than designing solutions. Agenda setting takes place, but often after the fact, when you know better what the agenda is. Implementation by networked professionals turns out to be less a stage of a policy cycle than a critique of policy having any "cycle," idealized or otherwise.¹⁸

Consequently, policy evaluation is difficult, if undertaken at all; it could not be otherwise when goals are defined in a process whose driver is to keep options open. All this is crucial to understand and expect when it comes to ongoing management of the financial mess, as we will see. Financial reform differs considerably, depending on whether the reform treats contemporary finance as a problem to be solved or as a mess to be managed. If seen as a problem, the public will insist on decisionmakers coming up with the best reform possible, given the constraints we all are operating under. If seen as a mess, networked professionals will have to manage it and be evaluated on that management, as it morphs in unpredicted directions in response to inevitable setbacks along the way.

Manage Setbacks Better

You cannot be a reliability-seeking mess manager and not expect setbacks in your work. After all, most things are said to fail (see Oremond 2005). Something sudden or unexpected happens that stalls management, and this setback is itself a mess that could go bad or good. It depends on how the setback is managed. For our purposes, setback management means managing events that are on the way to becoming bad messes, unless managed better. If that happens, the setback could even become a good mess. (For more on “managing the unexpected,” see Weick and Sutcliffe 2007.)

Try to put yourself in the position of the Secretary of the Treasury or the head of the Federal Reserve in February 2008, before the collapse of Lehman Brothers, the Freddie Mac and Fannie Mae debacle, and the bailouts of AIG and Citigroup. What you lack in terms of predicting the future has to be made up for by your attempts to prevent the subprime mortgage mess from metamorphosing into the free fall it did become in the last months of 2008.

What you do know in early 2008 is that underlying the subprime mortgage mess are those novel financial instruments having virtually no mandates to ensure their high reliability management.¹⁹ The securitized instruments were so baroque that the initial good news that risk was to be dispersed through these instruments had, by the end of 2007, been more than offset by the bad news that risk had ended up back on the banks’ balance sheets and under the purview of their regulatory mandates. “Imagine NASA sending men to the moon before it had figured out how to get them back home,” writes a columnist in the *Financial Times* at the end of 2007. “That is sort of what happened in the world of securitisation this year, as complex structures such as collateralized debt obligations blew up” (Lex Column 2007).

By February 2008 you know enough to understand that the financial instruments have increased the interconnectivity of the financial sector without the reliability requirements that the regulated banks had. You know, in short, that you have to move to the very limits of your competence to manage this mess. Why? Because you are now being told that the debt these instruments represent constitute “an accident waiting to happen” (Norris 2008; see also Wolf 2007). Indeed, the management challenge had become, as one U.K. regulator put it earlier, to turn “an accident waiting to happen into a near miss” (quoted in P. Davies, Tett, and Scholtes 2006). That is what the Treasury and the

Federal Reserve tried to do—to turn a very bad mess waiting to happen into a close call—when March 2008 rolled into view, and with it came the challenge of Bear Stearns, the investment bank.

In retrospect, the Bear Stearns bailout failed to prevent the financial mess from imploding into a crisis. But would conditions have been better or worse without the bailout? Having to answer that question raises the issue of trying to manage any kind of setback inside versus outside your domain of competence. For it is not possible to ascertain the counterfactual when you are in unstudied conditions. The issue of what would have happened had Bear Stearns not been bailed out will be a major bone of contention for years ahead. “All one can say is, ‘It’s probably not as bad as it would have been,’” Alice Rivlin, the former director of the Congressional Budget Office, concludes (quoted in Ben-david 2008). But can the professionals involved know enough to say even that?

It is much better to manage the mess of a setback within your domain of competence, even at the limits of what the professionals know, as managers can then resort to strategies involving bouncing back while planning the next steps ahead. If, however, the setback occurs in the midst of what is for professionals profound ignorance, its unpredictable consequences simply cannot be estimated. Under these circumstances, the inability to measure risks associated with the setback so as to manage them is the threat that has to be coped with. Coping is more reactive than it is resilient and anticipatory—coping is less mess and reliability management than it is crisis management.

What do I mean by “resilient and anticipatory” as distinct from “reactive”? There is no better place to start than with the definition of a setback: an unanticipated or sudden check in progress. Being unanticipated (that is, being unprepared for) has at least three implications for reliably managing setbacks as messes. First, the pressure is to catch setbacks early on. This means trying to address the conditions that make them unanticipated. Second, since setbacks are sudden, managers find them surprising. Third, because ignorance governs outside the domain of competence, setbacks and surprises can be expected to be more common when having to cope in that uncharted terrain. All of this implies that we cannot anticipate all the contingencies ahead in mess and reliability management, so we must have the resilience to bounce back from or absorb that which we cannot anticipate.²⁰ The further implication is that some degree of planning ahead is involved when trying to manage setbacks, as no one can expect the lack of anticipatory planning to be compensated for by greater resilience later.

But how do resilience and anticipation actually work in mess and reliability management? To answer this question, we can return to the control room operators whom Paul Schulman and I study. For these operators, anticipating the next step ahead is an instrumental part of responding to an interruption or shock that just happened (Roe and Schulman 2008). Anticipation is important because professionals may well not want to return to the original position. Managers for any critical service do not absorb shocks just so they can get back to the bad mess from which they started. Bouncing back is bouncing forward for them.

To translate the recognized patterns and contingency scenarios into reliable services, operators, be they inside and outside the control room, both plan the next steps ahead and respond to unanticipated events during the current or preceding steps. Thus, managers are eager to stay inside their domain of competence. Outside it, instead of being resilient and anticipatory, they end up reactive. Firefighting, band-aids, and quick fixes become the norm, but now to what end? What are they bouncing forward to? A widening reactivity, and with it the impulse to start all over again, become very much part of defining when a mess becomes a crisis.²¹ In effect, a crisis is the collapse of the mess and reliability space into the reactive micro-operations hub of figure 3. Resilience linked with anticipation, in contradistinction, are part of that space's middle domain of competence.

More often than not, however, the literature on crisis prevention treats resilience and anticipation as separate, alternative strategies rather than linked and as basically one strategy as just described. This decoupling of resilience and anticipation, in turn, limits our understanding of the importance of managing setbacks. To see how, turn to that wider literature on crisis prevention and its discussion of the putative differences between anticipation and resilience.

A major part of crisis preparation is planning ahead in order to be agile and quick (that is, resilient) when crisis hits. You plan now so you are not solely reactive later; better anticipation today leads to better resilience when you need it afterward. For example, *The Federal Response to Hurricane Katrina: Lessons Learned* (2006), a report to the U.S. president, identified eleven "critical actions" that had to be completed before the next hurricane in order to have a "national preparedness system" and a "culture of preparedness." Six of the eleven are listed here:

- Co-locate relevant Federal, State, and local decision-makers, including leaders of State National Guards, to enhance unity of effort;

- Pre-position a fully resourced and integrated interagency Federal Joint Field Office to coordinate and, if necessary, direct Federal support to the disaster;
- Ensure situational awareness by establishing rapid deployable communications;
- Designate locations throughout the country for receiving, staging, moving, and integrating them;
- Encourage States to pre-contract with service providers for key disaster relief efforts; and
- Enhance on-going review of State evacuation plans; and incorporate planning for Continuity of Government to ensure essential and emergency services.

Note that a setback in executing one or more of the action items amplifies the crisis when it occurs. If you do not work out the colocation plans or service contracts or evacuation plans before the disaster, you will be worse off when disaster strikes. A setback in anticipation leads to the inability to respond as rapidly as you could have, had the action item been implemented beforehand. Setback in anticipation leads to setback in resilience.

Much the same complaint has been made about the financial mess. It has been argued that the subprime mortgage mess was anticipated but that warnings about it were not heeded.²² Consequently, so this argument runs, emergency measures, not resilience, moved to the fore in the form of reactive bailouts and policy U-turns (see Taylor 2009 on the Federal Reserve).²³ From the perspective of the crisis prevention literature, forecasting a mess but not taking action to prepare for it because of this or that setback is a prescription for brittleness and lack of resilience.

In other words—and here is the important point—the role of setbacks in anticipation and resilience in crisis prevention turns out to be orthogonal to the role of successful resilience and anticipation in mess and reliability management. In the former case, the failure to anticipate reduces the ability to be resilient later on. In the latter, being resilient and anticipatory occurs in the same moment—for example, when operators respond to a shock, they are already preparing for what's next. The chief virtue of managing messes so they do not turn into crises is then this: You get resilience and anticipation jointly, not separately.

From the vantage point of mess and reliability, the response to Hurricane Katrina might not have been better had there been more

pre-Katrina reports pointing out levee deficiencies, more newspaper articles on a pending disaster, and more “Hurricane Pam” simulations that turned out to be prescient. What we had here was more complex than a failure to anticipate, subsequently producing a failure to be resilient. In the same way, crisis management in the financial mess might not have been better had there been more experts, like the Federal Reserve’s Ned Gramlich and the investor Warren Buffett, sounding early alarms. From a mess and reliability management perspective, the primary problem was not anticipation *per se*. Rather, it was what was happening as well to resilience before and afterward.

How so? The mess and reliability perspective would be asking the following about Katrina: Given that before the hurricane some 60 percent of U.S. grain exports went through New Orleans and over 25 percent of domestic oil production—mostly offshore oil drilling—came from the Gulf of Mexico, how did grain companies and oil refineries—reliability-seeking mess managers extraordinaire—build resilience into their operations before the disaster, and how did that capacity affect their rebounding during and after it? Parallel questions were raised in the financial mess, though not always with the priority their answering deserved: Because not all banks and investment firms, in the United States or abroad, weathered the financial mess in the same way with the same effect, how similar banks were able to avoid or better accommodate similar problems is of acute interest, if only to compare the better practices for mess management at those banks to what those more reactive decisionmakers did by way of crisis management at the failing banks. How, in short, did those oil and grain companies or these banks and investment firms—which, like many public-sector agencies, have long supply chains—manage the inevitable setbacks, and what can the rest of us, as prospective better mess managers, learn from this?²⁴

Where, though, are the good messes in managing setbacks? Managing setbacks better is one thing; pulling the good messes out is another. Positive setbacks are never far away, if only because “brains have a remarkable talent for reframing suboptimal outcomes to see setbacks in the best possible light” (Begley 2005b). My reading and work suggest that there are four types of good mess management when it comes to casting setbacks in that positive light. Most familiar is the argument that organizations do not transition from one stage to another in their life cycles without overcoming the obstacles characteristic of the organization’s current stage (Harrison and Shirom 1999). Other setbacks serve as a test bed for developing (more) resilient and anticipatory strategies in the organization. Another cluster of setbacks

can be better thought of as design and practice probes into whether that organization is broadly on track and, if not, what track it should be on. In yet other instances, setbacks serve to remind managers that other things matter for what they are doing. Here, setbacks unsettle what had been settled knowledge yet in a way that does not question the premise of having to reliably manage regardless (see Hillman and Phillips 2007).

In all four cases, the positive feature of the setback is to slow down—or add a “lag” to—a process that could be very difficult to manage if that interruption had not occurred. Unlike free-floating calls for more deliberation, the “lag” here is the specific combination of being resilient and anticipatory at the same time, so as to cool down what could be hot processes that would otherwise be even more difficult to manage.²⁵ Suffice it to say that these positive setbacks are much better messes to be in from the perspective of network-centered decision-making than from that of its problem-centered counterpart.

Will the financial mess serve as a timely interruption that confirms just how central the regulators are to the continuity of the financial and credit systems? Will the mess end up as a much-needed probe of just which financial institutions are staying on track and under mandate? Will the mess be the test bed for strategies and practices that ensure more resilience and anticipatory capacity in lending and investing? Last but not least, will the mess in effect be an obstacle, the surmounting of which is necessary to promote the operational redesign of the financial and banking sectors in more reliable ways? Certainly policymakers and regulators have tried answering “yes” to each of those questions, but that, as with all macro designers, is only a first step. Reliably answering those questions is, I believe, a core task of the real-time economists and financial professionals (Roe 2009). The answers are also core to a financial regulation that took positive setbacks and associated operational redesign of those regulated much more seriously. This is particularly important when (1) senior executives of the organizations in which the setbacks are occurring are denying that there are setbacks or (2) if the setbacks are recognized, the organizations are so seized up in just-for-now management that they do not have a longer-term perspective to render the setbacks under way as positive.

By way of summary, many of the points about good mess management in this chapter are neatly illustrated through the story behind one of the most famous pieces of Chinese calligraphy, Wang Xizhi’s *Preface to*

the Poems Composed at the Orchid Pavilion. It is said that on the third day of the third month of the year 353, Wang Xizhi invited some forty fellow scholars to a purification ceremony. After the ceremony, the scholars sat on both banks of a winding stream to compose poems and enjoy wine in a drinking contest. Cups of sake were floated down the stream, and in one version of the story, wherever a cup stopped, the scholar closest to it had to extemporaneously compose a poem. If he could not come up with an impromptu poem quickly enough, he had to drink the sake as a penalty. Merry he might end up, but the drunken scholar risked his reputation as a poet in the process. At the end of the contest, twenty-six of the participants had composed thirty-seven poems. It is this pressure, skill, and contingency—all with the mandates governing their interaction, and most of it done just on time—that describe this book's professionals, the contest they undertake on behalf of what matters, and the notion that being unprofessional has its penalties. I shift now to the specific challenges ahead for these professionals.

SIX

SOCIETAL CHALLENGES

Constantly shifting policy and markets, personnel churn and turnover, fast-moving technological change, ever more regulations and new reliability requirements, and ramifying interdependencies make for more mess and ever greater demands for reliability. Much has been written about this state of affairs, but here I address three societal pressures working against better management that have not gotten the attention they deserve: problematic cycles of mess and reliability; poisonous macro design and micro operations; and the future as today's major policy mess, including its persisting politics of higher volatility and fewer options. Chapter 7 discusses the professional challenges facing managers and operators in the middle as they respond to the wider societal pressures discussed here.

Problematic Cycles of Mess and Reliability

We saw at the beginning of chapter 2 that stability in the financial markets was said to have led to more risk taking and eventually to the financial mess. We're now in a position to be specific about that process. Below I summarize a cycle of mutually reinforcing mess and reliability in five rough and interrelated propositions. They derive from my reading of the dynamic between mess and reliability in those cases where single resources, such as electricity (or water, telecommunications, or a car), end up having to provide multiple services under increasing reliability mandates. Note here only that the drive to transform single resources into multiple services, and reliably so, can be found in a variety of forms today, embracing as it does one-stop shopping and service centers, multistrategy funds, biodiversity hot spots, multichannel TV screens, and dual-use biotechnologies, among many others.

Proposition 1: The more services demanded from a single resource, the greater the demand for reliability in each service and the messier it becomes to ensure reliability (where that reliability remains the safe

and continuous provision of a vital service). The more you rely on the hospital, the more services you demand from it. The same is true for firefighting services. First, crews responded to fires; then they had to respond to virtually any emergency call. Our power lines are expected to carry not just electricity but now also broadband for Internet access. Banks originally provided accounts and loans; then we required all kinds of financial services from them. In such periods of expansion, reliability mandates and service provision suffer growing pains; their management becomes overstretched, however temporarily, as managers maneuver across their four performance modes. Management gets messy.

Proposition 2: The messier it is to provide multiple reliable services from a single resource, the more the services are provided reliably only in real time—if at all—when the performance standards are clearest. Police now respond immediately only to 911 calls of activity in progress. The hospital focuses on the inpatient emergency room and the intensive care unit, leaving much of the rest to outpatient services. The bank shifts from waiting lines in front of few tellers, to many ATMs, with the emphasis on the A for automatic. Why? Because performance criteria and foregone alternatives (opportunity costs) are clearer in real time: Did the police come at once, did you get your emergency care, and is the cash actually there?

Proposition 3: The more the services are reliably provided in real time, the more likely it is that there will be demand for new services from that multiple-service resource, and the messier it will be to ensure that any of those services is reliably provided, right now. This looks to be a variant of Proposition 1, but managers find themselves now limited to cycling between high-volatility performance modes only, what they call the “real-time” reliability of just on time or just for now. To see how, go back to your ATM. Before, it provided cash and deposit services; then it became a single stop for various transactions, such as the purchase of postage stamps (Kingson 2006). A new mess confronts you when the multipurpose ATM and others nearby are all out of order, and none of these expanded services are available. It’s the same with your cellphone: “Imagine a magical device that could boost entrepreneurship and economic activity, provide an alternative to bad roads and unreliable postal services, widen farmers’ access to markets, and allow swift and secure transfers of money. Now stop imagining: the device in question is the mobile phone” (*Economist* 2005).¹ But what happens when reception drops, as the stakes are now so much higher?

Consider also the once humble car. The more congested our roads

became and the more time spent stuck in traffic, the more pressure there was to turn the automobile into a multiple-service resource, with the addition of all manner of real-time services to the vehicle: cell-phone and charger, USB port to install new software, DVD player in the back, GPS up front, and a great stereo system throughout. Having added services—why not learn a new language while you’re stuck in traffic?—we now have the problem of preventing cross-system failures in the vehicle as a whole, including attention deficits and pressures to multitask for the drivers.² As John Plender phrased an argument with respect to financial systems before the mess, “the longer the market’s superstructure proves reliant, the more reliance will be placed on it, even though it has not been tested in really difficult times” (2006, 13).

Proposition 4: The more the services are reliable only in real-time and the messier their reliability management, the greater the pressure to decouple one or more services from the resource, and the more likely a new resource will eventually be found or created to provide the decoupled service reliably. Banks ceased to be the only source of multiple financial services; all manner of major financial transactions have ended up being provided elsewhere, such as through hedge funds. “Credit derivatives,” we once thought, “permit risks to be unbundled and transferred to those players in the financial markets best able to absorb them” (Plender 2005). Among the responses to the financial mess have been recommendations that firms be managed in ways that make it easier to decouple their services: “The key requirement is that assets that are needed for the continued provision of these [critical] services can be quickly separated from the organizations engaged in their supply. The businesses involved must be required to operate in such a way that such a separation is possible” (Kay 2009c). “If regulators want to protect against another financial crisis, it seems they’d be better off trying to decouple executive pay from the expansion of financial empires” (based on research discussed in *Wilson Quarterly* 2012, 64). Examples of easier decoupling are proposed “living wills” to enable financial institutions, presently “too big to fail,” to unwind business without a severe disruption to finance and banking as a whole. That, however, depends on there being a new resource, in this case, new regulations and methods with which to reliably determine and govern “systemically important financial institutions.”

Proposition 5: The more reliably the service is provided from the new resource, the greater the pressure will be to demand more services from that resource . . . and so the dynamic continues. To stay with the financial mess, not only did the volume of credit derivatives increase, but so did derivatives for other purposes and other types of risk. Yet we saw

this news proved to be far from good. As early as 2007, a fixed-income manager lamented: “The fact that the risk was diversified was a good thing. Now everyone is panicking because they don’t know where it is” (quoted in Tett 2007a).³ In case it needs saying, it is not obvious what new resources, if any (including better regulations), will emerge from efforts to decouple systems to prevent cross-system failure. Nor is there anything inevitable about the dynamic. True, we have seen decoupling and emerging new resources in the road transportation sector—the advent of private toll roads separated from the more congested public freeways—but this does not imply that such activity will happen everywhere.⁴ Nor is the implication that the dynamic in each and every case is as mess-inducing as it has been in the financial sector, where what was thought to be decoupling (unbundling risk) turned out to be concealed recoupling (aggregating and correlating risks in unperceived ways).

Nor, finally, is there anything stopping decisionmakers from intervening and precipitating more mess. Consider California’s electricity deregulation in the late 1990s. Was it an example of premature intervention by politicians or the expected decoupling of an over-mandated service reliability? The dynamic leads us to expect that at some point electricity as a service could have so many competing mandates that new or different structures would evolve to handle these mandates more reliably or less messily. Witness the proposals for a smarter grid circulating at the time of writing. Yet, not once have I come across anyone arguing that the integrated utilities were deregulated because they were not reliable enough. The rationale for deregulation was just the opposite. The integrated utilities were said to be overly expensive because they were *too* reliable. What a waste it was to have those utilities ensuring “six-nines reliability” (99.9999 percent)—or so we were told before the crisis (Roe and Schulman 2008). In this instance, the political intervention was clearly precipitate, and we ended up with a new policy mess to manage—which it must be pointed out was managed more reliably in the electricity control rooms than most people realized (Roe and Schulman 2008, chapter 1).

Mess and reliability professionals always face society’s pressure to turn resources into “critical” resources, each of which is expected to provide more and different reliable services. The demands for mess and reliability management must be expected to increase, and with them, I argue, the difficulties just mentioned. New resources emerge at different rates across different, but interconnected, critical service systems; often, interventions by others outside their respective domains of competence turn out to be counterproductive for those inside. The middle-domain professionals can also be expected to try to cobble

together and recouple the disparate resources and services in order to ensure some measure of “good enough reliability” (good enough because managers are fast enough with just enough, knowing full well this is never enough all the time). Consequently, we can and should expect professionals to move increasingly to the edge of their capabilities across all performance modes as their task requirements accelerate. Already, many reliable mess managers are at the limits of know-how and competence in their networks.

Poisonous Macro Design and Micro Operations

Let us return to figure 3 (see chapter 3), where the arrows in the mess and reliability space point from macro design to localized scenario formulation and from reactive micro operations to systemwide pattern recognition, as professionals navigate to service reliability. Those arrows reverse when the following happens: (1) policymakers come to think that the only scenario they confront is the need for more macro design to correct (2) the only pattern they think they now confront—namely, major human error at the micro-operator level. Decisionmakers now believe they have no choice but to macro design better micro operations directly. When this happens, “management” defaults to the faith-based macro-to-micro shortcuts discussed in chapter 4.

The difficulty here is not only that the learning and expertise of mess and reliability professionals are bypassed in the leap from designing macro solutions to addressing micro-operator behavior. Worse, there may no longer be much of a middle to bypass. We saw how professionals in securitized finance were forced to work outside their domain of competence, thereby making them more error prone without patterns or scenarios to use in appraising and assessing multiple performance-based risks. But the process of disorientation needn’t stop there. Even where a domain of competence survives, prolonged just-for-now performance can erode it. The longer a mismatch persists between the skills that managers and operators have and the task requirements they face, the less competent these professionals become.

The mismatch poisons management in two ways. First, the domain of mess and reliability professionals shrinks due to the deprofessionalization of management expertise. If the unstable conditions persist with their firefighting, band-aids, and quick fixes, then what mess managers can handle reliably—the domain in which their cognitive skills match the tasks required of them—constricts. Patterns and sce-

narios that were of use in other performance conditions fall into disuse, since the conditions and related practices that matter are continually just for now.

This leads to the second lethal predicament. What was known before is no longer “known.” Professionals are expected to perform reliably in areas where they no longer manage but still operate. Either way, mess managers are expected to rely on their judgment in new settings exactly where that judgment is now least reliable and learning most difficult. Here again they don’t manage; they have to cope—and there are times when they cannot even do that. The Financial Crisis Inquiry Commission (2011) repeats the term “too little, too late” to describe such conditions. One could even say that a key characteristic of the part of the financial sector that went into meltdown was its “too-little-too-late reliability.” For example, a leading (not lagging) indicator of increasing financial distress may well have been the tightening (not relaxing) of bank-lending practices beforehand (see Carlson, King, and Lewis 2011).

Increased errors are inevitable when the skills-tasks mismatch persists indefinitely. As mentioned in a preceding chapter, infrastructure operators reported that they committed one kind of reliability violation in order to prevent other more serious violations from occurring, so they wouldn’t back themselves into a corner they couldn’t get out of during just-for-now performance conditions. As forced errors increase, the calls for systemwide redesign to eliminate the errors can be expected to increase as well. After a point, when managers are having to operate for longer and longer periods outside of their domain of competence, there is no longer a resilient and anticipatory middle domain to even bypass in making the macro-to-micro leap. Instead of starting from macro design and micro operations and moving to the middle, policymakers end up with macro design as the single standpoint from which to address micro errors at the operator level. By this time, poison has spread through the organization that is managing for reliability.

The point, however, is that no amount of macro design can directly correct for inadequate operator skills, especially capabilities that are poisoned in the two ways just described. The more macro design, the greater the human error when it comes to reliability management, for reasons already outlined in chapter 3’s discussion of why it is necessary to tack to reliability, in the sense of moving indirectly across and through the mess and reliability space. It is very important for the reader to understand how dangerous this attack on manager competence can be. Here is an extended example of how it can occur.

On March 8, 2004, control room operators in CAISO, the major manager of California's electrical grid, were taken to have contributed to a major load-shedding event. Blackouts occurred in Southern California, with an internal CAISO review finding fault with the two generation ("gen") dispatchers in its control room during the incident. According to a CAISO press release, "Preliminary California ISO Internal Investigation Finds Operator-Error Contributed to 20-Minute Outage in Southern California." Our research discussions with participants in the incident found that the two gen dispatchers were managing to an edge they felt was part of what had become normal grid operations under persisting conditions of high volatility. In contrast, the crew's shift manager and the control room's reliability coordinator felt that the morning's load increase required clear and timely actions to keep the system from moving over the edge and into a corner out of which the control room could no longer manage for reliability purposes. In our terminology, the gen dispatchers saw themselves in just-on-time performance mode, where they were managing a highly volatile system with many options. The shift manager and reliability coordinator, on the other hand, saw the dispatchers in just-for-now performance, where there were far fewer options under such persisting conditions. The dividing line between the two modes was no longer clear or agreed-on by the professionals concerned (see figure 5).

In effect, the gen dispatchers tried to minimize Type II error (shedding load unnecessarily), while the shift manager and reliability coordinator saw Type I error (not shedding leading to major outages) increasing dangerously as a result.⁵ In my view, the difference in perceptions arose because control room operators had to spend more and more time in the most difficult mode for any mess and reliability professional: just-for-now performance. In this view, the gen dispatchers' perspective that they were in just-on-time mode was wrong. But prolonged just-for-now conditions are exactly those that give rise to such differences in how micro operations are perceived among operators and managers.

This conclusion, however, hinges on there being a correct decision. In this view, the operators were or were not in a given performance mode; whatever performance mode they were in, there was a proper decision to be taken warranted by those prevailing conditions. Yet it can be argued that in the March 8 disturbance, the determination of what was the correct decision was precisely what was being disagreed about, as if persisting just-for-now conditions had already pushed the gen dispatchers into unknown terrain. It is not possible to determine if that actually happened (for reasons that become clear below), which makes the incident more troublesome.

		System Volatility
		High
Options Variety	High	Just-on-time performance
	Low	Just-for-now performance

Figure 5. Differing perceptions of the March 8, 2004, disturbance in the CAISO control room

The two dispatchers and the shift manager and reliability coordinator insisted that they had not erred. For the gen dispatchers, the error was the decision of the shift manager and reliability coordinator to second-guess the dispatchers' decision and end up shedding load when it was not shown to their—the dispatchers'—satisfaction that this was necessary. The shift manager and reliability coordinator saw it as their role to shed load when conditions required it, whether or not gen dispatcher error was involved. This difference points to a potentially major source of errors that can arise with reversing the arrows in the mess and reliability space. Not only are there differences in perception as to what performance mode the professionals are operating in, but also—and more fundamentally—professionals may end up disagreeing about just what the knowledge is within which they are managing and the scale at which management is taking place. They begin by disagreeing over what the patterns and scenarios are, but they end up disagreeing over what are in effect the very dimensions of the space in which reliability and mess are to be managed: the scope of the issue and the knowledge about what to do. Just when conditions are at the most

urgent and require a proper decision, the event itself raises questions about just what is the correct decision when issues of knowledge and scope are no longer stable. As one of the gen dispatchers involved told us, “It wasn’t ever explained to me whether it would have been better had we not shed load.” In other words, that these professionals could see the fundamentals so differently may have indicated a more serious erosion of team situational awareness than initially thought existed. We will never know whether that happened, if only because that requires the same knowledge that those involved had then, but which they may have been questioning in ways they didn’t even realize.

This is the poisonous nature of such developments wherever they occur: What looks to be the macro designing of better micro operations can turn out to be nothing less than the attempt to macro design the entire mess and reliability space, so as “to get rid of all that mess” in operator error and error-prone micro operations. What else can we do, the senior executives and boards tell themselves, when our entire business is on the line? We have to reinvent ourselves; we have to risk failure in order to succeed. However—and here is the challenge—when upper management seeks to implement these risk-taking changes in critical service provision, they rely on middle-level professionals, who, when they take risks, do so only in order to *reduce the chances of failure*. How else can they manage a policy mess reliably? To reliability-seeking professionals, the risk-taking activities of upper management or officialdom look like a form of suicide motivated by fear of death. It’s a cognitive flip into an empty pool.

Such organizational suicide can be seen at work in events leading up to and during the financial mess. Before the mess, good bank practice was to hold capital as a cushion against *unexpected* losses; new capital security accords then mandated that banks hold capital against losses that must be *expected* because of their high-risk lending (Silverman 2003). Before the mess, mortgage brokers made money on the performance and quality of their mortgages, once finalized; but the standard compensation package changed to one based on the volume of loans originated and passed on (FCIC 2011, 7, 89). We know from the literature that such reversal of important decision rules can lead to organizational failure on a wide scale (for the *Challenger* accident example, see Roe 1989). Requiring cognitive flips on the part of managers and operators that reverse what their skills tell them to do is a sure way to dissolve the mess and reliability space into uncharted waters.

The double dose of poison—erode manager competence and then send managers into conditions they don’t know or no longer have the

skills to deal with—was also evident in other ways in the financial meltdown. One important feature of the mess was how illiquid (un-priceable or unmarketable) novel financial instruments became over an extended period. As we saw in chapter 2, liquidity has a great deal to do with having the flexibility and added options of just-on-time performance in banking and finance. Illiquidity can be seen as the drying up of flexibility and options, when the ability to assemble options and maneuver creatively under the pressure of time dissipates.⁶ Yet, at some points, illiquidity in the financial mess may also have indicated something altogether worse, more akin to the March 8 episode described above. The financial mess became a crisis exactly when professionals and others could no longer trust the knowledge base from which they were managing or the scope of the “problem” before them. A well-known economist said of the financial upheaval that “the problem became huge because ‘policy innovations’ had been racing ahead of comprehension. The securitisation of mortgages was an innovation that led unwittingly to what Wall Street calls ‘betting the company’” (Bhagwati 2008). This turned into a world where CEOs’ road maps to exploiting modern finance and their materially misleading statements about their companies’ financial health were matched by their cognitive inability to see their financial death or near miss coming when and how it did (see Eisinger 2012). It was an economy in which many experienced professionals could not cognitively distinguish asset illiquidity from institutional insolvency.⁷ Once managers are in conditions that neither they nor the rest of us can comprehend, why should it be surprising to them or us that what indicated success before—lower mortgage rates, smaller down payments, rising income from housing sales—ended up indicating something unimaginably bad instead? We’re told at the beginning of 2012 that the “leaders of the pack” in the S&P 500 “are still . . . technology, healthcare and financials” (Rosenberg 2012, 20)—as if this is on net a positive rather than negative development?

The Future as Today’s Major Policy Mess

For the Wharton School’s Russell Ackoff, and Sheldon Rovin, “mess is the future we are now in, barring any change” (2003, 97). Many of today’s plans and projections assume a future that cannot happen, and yet it is this seeming impossibility that we have to manage today. Our biggest policy mess, in this view,

is the future implied by our current practices and behavior and the changes we expect in our environment. Such an implied future of every institution would show how it is on a path to self-destruction because it failed to adapt to (even expected) changes in its environment. . . . For example, the mess the Federal Reserve Bank formulated in the 1970s showed that if nothing new were done the bank would eventually require more check clearers in the United States than there were people. It was the awareness of such a crisis that led to development and propagation of the electronic funds transfer system. A more current example is in health care. At the current rate of increase of gross domestic product . . . about 100 percent will be devoted to health care by the next century. Of course, this is absurd! We can't and we won't spend all our nation's money on health care. But knowing where we are headed without significant intervention might help us make the appropriate changes. (97–98)

To be specific, the future with respect to almost any major sector is its own policy mess today. While something like this has always been the case (as in the fear of hell and damnation), clearly many of the messes, like the financial one we are now in, have worsened in the last decade. According to current projections, the annual interest on the U.S. government debt will eventually “rival defense expenditures . . . [and] would exceed all domestic discretionary spending, a category that includes spending on infrastructure, education, energy, and agriculture—in effect, anything other than entitlements and national security” (Altman and Haass 2010, 27). That's only for the national debt. There are also pensions, Social Security, and Medicare. Earlier reports of the huge structural overhang in federal liabilities found that “the U.S. currently faces a future of chronic federal budget deficits totaling at least \$44,200 billion [\$44.2 trillion] in current U.S. dollars” (Despeignes 2003). Such calculations, tied to the work of the economists Kent Smetters, Jagdeesh Gokhale, and Laurence Kotlikoff, seek to estimate the net present value of U.S. federal obligations, most of which are for Social Security and Medicare, compared to forecasted revenues: “Smetters and Gokhale calculate it would take a 69 percent hike in all federal taxes or a 95 percent hike in payroll taxes to close the \$44 trillion gap” (Bernasek 2003). But this conclusion too is absurd. Raising taxes that much would destroy the political economy on which the taxes are based—and all these calculations were made before the financial mess made things worse.

The economist Martin Feldstein sums up the challenge: “What Larry [Kotlikoff] has done is to say what happens if we don't do anything to

fill the gap. . . . That's not what will happen. Either we'll raise taxes, cut benefits, or change the way we finance the system. Or it will be some combination of all three" (quoted in Bernasek 2003). That is to say, somehow we will have to manage, but the point is we do not know now how this will happen—just what taxes will be increased, expenditure cuts made, and finances curtailed—or how it all will be sorted out. To take another example, it is easy enough to predict a major catastrophe on the Bosphorus shipping lanes (see de Waal 2008), but who is to do what about that prediction now, as you are reading this paragraph? In sum, it is as if the long run is already here and that our challenge must be "to foresee the present," as A. R. J. Turgot, the eighteenth-century French economist and statesman, put it (quoted in T. Clark 2012, 73).

The future is the mess we are in partly because present cognition about that future has its many limitations. The psychologists Daniel Gilbert and Timothy Wilson (2007) identified four kinds of errors in thinking about the future and how we experience that prospection. Our expectations of the future can be unrepresentative, because they often are based on extreme, rather than common, events that have happened to us; essentialized, because they leave out the details about how the simulated future is to be achieved; abbreviated, because we focus on a few select moments of the future, and early ones at that; and decontextualized, because the context in which we form expectations about the future may well not be the same in which they are realized, if in fact they are realized at all. Is it any wonder, then, that we make a hash of it when we think about the future on our own, and why it is so important, as discussed in chapter 5, to think within networks of professionals who adjust for these biases without the expectation that they can be eliminated? This is why current savings, and the flip-side investments, are so important: They are inevitably networked resources that enable their holders to imagine (if not anticipate) a better future now—a good-mess present in which to be, given the cognitive limitations just discussed.

These limitations were never far away in the financial mess and its aftermath. "The next pending crisis," Alan Greenspan told a U.S. government commission looking into the financial mess, "will no doubt exhibit a plethora of new assets which have unintended toxic characteristics which no one has heard of before, and which no one can forecast today" (quoted in Politi and Rappeport 2010). Yes, but that very inability to forecast is part of the mess we are in today, not just later on. Or, to put the point the other way around, the only place the future can be reliable is now, and only if we are managing our messes right now in light of our inability to predict with any great assurance.

“In the short term, the question is: how do we get out of this [financial] mess?” Gillian Tett, a respected commentator, asked (*Financial Times* 2009). The answer is that we cannot predict how, which is the mess we must be managing for. And how could it be otherwise? If government by definition is too big to fail—and if markets by definition consist of firms, no one of which should be too big to fail—then when some financial institutions become too big to fail, is it any surprise that government intervenes, if not to protect what remains of the market, then to protect what becomes of government? This is a huge policy mess, and the challenge of sorting it out must include looking for emerging sector-wide practices and adapting them locally, without hoping to clear any of the mess away once and for all.

Such better practices—emerging while evolving (sometimes serendipitously, other times not), never final and definitive as “best practice”—are important for mess management not just when they represent added options and resources for managers already working under volatile situations. That is to say, better practices are not only important because they may make the difference between having to manage reactively, just for now, rather than managing flexibly just on time. Better practices also represent learning from managers like ourselves who have managed more effectively in situations like the ones in which we find ourselves. Those managers too have political, economic, and social constraints; nonetheless, they have met a performance standard higher than we ourselves face as we grapple with the same constraints. There are 89,000 distinct governments in the United States alone, and a good number of them must have something to learn from those like themselves.

All too often more attention is given to those constraints than to the emerging better practice taking place in spite of them. Politics, dollars, and jerks—now *they* are the real source of our big policy messes, or so I am frequently told. “We can’t be confident of anything after learning of this cesspit,” said Paul Tucker, the deputy governor of the Bank of England, when asked about another allegation of widespread banking malpractices (quoted in Quirk 2012, 34). If only we had better politics; if only money didn’t drive the politics we have; if only we didn’t have to work for the jerks causing all this, then we wouldn’t be in the mess we’re in. This has certainly been offered as a major explanation of the financial meltdown by people even within the banking and finance sector. To explain the financial mess, we are told to look no further than to the banditti and politics of major financial institutions. The chief executive of a large Austrian banking group asserts the reason behind the nationalization of a major bank there as follows: “It’s a

bunch of scumbags—in terms of banking and in terms of politics—from Austria, who have [teamed] up with scumbags from central and eastern Europe and a couple of idiots from further west, and out of this came [our] huge mess” (quoted in J. Wilson 2010).

That’s one way to put it: “The System” becomes just another syndrome. The road maps to market failure profited and corrupted those who found ways to exploit market power, asymmetric information, and externalities for their own advantage. That said, blaming politics, dollars, and jerks may be true as far as it goes, but as an explanation it certainly does not go far enough when it comes to the politics actually constraining management and within which management has to work. To understand such politics from a mess and reliability perspective, we must understand the cultures and organizations in which we manage across the performance modes available to us. This large topic has not been considered in ways that illuminate the messes around us and the demand for their reliable management. In reality, a politics of higher volatility and fewer options saturates the mess and reliability space, and we need to know why, if only to understand that the search for better practices under such conditions is paramount.

This societal challenge goes well beyond pressuring mess managers to operate reliably in areas where they have few known patterns and scenarios to follow. They are not just being pushed deeper into ignorance from a shrinking domain of competence. Professionals are also being required to accommodate, if not resolve procedurally and administratively, deep cultural and organizational differences. Many professionals operate within organizational arrangements that ensure interagency conflict with respect to the outputs and outcomes of their reliability and mess management activities. Furthermore, these differing cultures and organizations generate the dimensions of this book’s performance modes and the mess and reliability space. The politics of higher volatility and fewer options is so challenging to managers because it strikes to the core of their management. Given the importance of these issues, I focus the remainder of this chapter on them.

To summarize this subsection’s argument, our knowledge bases, the scales at which we operate, and our views of what we take to be volatility and options—what we take to be mess and reliability—come from the cultures we subscribe to as well as the organizations in which we manage across different performance modes. The approaches I draw from are cultural theory, with its focus on competing hierarchist, individualist, egalitarian, and fatalist cultures; James Q. Wilson’s typology of production, craft, procedural, and coping agencies, each with a different orientation to organizational outputs and outcomes; and

the performance modes discussed in this book. The first two approaches are already familiar to a good number of academically trained policy analysts and public managers. As I show below, the four performance modes fit into each type of organization, and all four types of organization are nested in a hierarchist culture that is itself at fundamental odds with the other cultures important to managing our critical services reliably. This nesting and the differences realized along the way are the source of what I call the politics of higher volatility and fewer options. I am aware that the approaches I rely on here are abstract and can be little more than heuristics in describing what is admittedly, first to last, a messy policy world. Their great virtue, I believe, and the reason I choose to focus on them rather than others, is that their abstractions frame policy messes better than the other approaches.

Start with culture, a much-written-about topic for which we can be much more specific when it comes to mess and reliability (for a fuller discussion of cultural theory and points raised below, see Roe 1998). The cultural theory of Mary Douglas and her colleagues, especially Michael Thompson and the late Aaron Wildavsky, posits four basic cultures, which are exceptionally useful to understanding the drive to mess and reliability. The cultures are hierarchist, egalitarian, individualist, and fatalist, each one defined by where people locate themselves in terms of the degree of social constraints they face (“grid”) and the degree of group cohesion with which they act (“group”):

[Mary Douglas] argues that the variability of an individual's involvement in social life can be adequately captured by two dimensions of sociality: group and grid. *Group* refers to the extent to which an individual is incorporated into bounded units. The greater the incorporation, the more individual choice is subject to group determination. *Grid* denotes the degree to which an individual's life is circumscribed by externally imposed prescriptions. . . . Strong group boundaries coupled with minimal prescriptions produce social relations that are *egalitarian*. Because such groups lack (as a consequence of their low grid position) internal role differentiation, relations between group members are ambiguous. . . . When an individual's social environment is characterized by strong group boundaries and binding prescriptions, the resulting social relations are *hierarchical*. Individuals in this social context are subject to both the control of other members in the group and the demands of socially imposed roles. . . . Individuals who are bound by neither group incorporation nor prescribed roles inhabit an *individualistic* social context. In such an environment all boundaries are provisional and subject to negotiation. . . . People who find themselves subject to binding prescrip-

tions and are excluded from group membership exemplify the *fatalistic* way of life. Fatalists are controlled from without. (Thompson, Ellis, and Wildavsky 1990, 5–7)

To give an example, many people argue that the way to achieve better policy design is to bring those street-level workers discussed earlier and their frontline knowledge directly into the planning process (M. Hill and Hupe 2002). Cultural theory asks which kind of street-level worker? Burnt-out caseworkers (fatalist)? Policy entrepreneurs able to exploit bureaucratic loopholes for their own advantage (individualist)? Advocates of grass-roots participation in the community (egalitarian)? Or those managers who know both the local and the official and how to work within the confines of each (hierarchist)?

The four cultures reinforce each other as a plural value system: “Each way of life needs each of its rivals, either to make up for its deficiencies, or to exploit, or to define itself against. . . . Were egalitarians to eliminate hierarchists and individualists, for instance, their lack of a target to be against would remove the justification for their strong group boundary and thus undermine their way of life” (Thompson, Ellis, and Wildavsky 1990, 4). The cultural theorist recognizes that these cultures are in important respects incommensurable and that there is no way to reconcile one entirely to another. Alliances exist but are not guaranteed to last. Wildavsky and other cultural theorists stress that the breakdown of alliances and cultural polarization characterize much of recent U.S. politics.

The incommensurability and pluralism of cultures are the armature of policy messes, as both insist on differences in the knowledge we have and in the scope over which we work, when it comes to what we differently define as mess or reliability. They also insist that the “we” are most certainly not homogeneous. But why are multiple ways of knowing and behaving possible? The answer is the same unstudied conditions that prowl around our policy messes. “There is always enough irreducible uncertainty in the world for us to be able to bias our convictions this way or that,” according to Thompson, Ellis, and Wildavsky (1990, 10). “All that cultural theory requires is that there always be some uncertainty of this kind.” Cultural theory frames how unstudied conditions serve as the initial conditions against which mess and reliability are to be defined, as well as managed.

It is important to identify the orthogonal views that the four cultures hold about how to manage needs and resources, because these views later relate to volatility and options.⁸ “Needs and resources,” Thompson, Ellis, and Wildavsky maintain, “are socially constructed” (1990, 39).⁹ Each cul-

ture has its own “need-and-resource-managing strategy” (48). To cut to the quick, fatalists believe you can manage neither your needs nor your resources; egalitarians believe you can manage your needs, but not your resources; hierarchists believe you can manage your resources, but not your needs; and individualists believe you can manage both needs and resources. When so, it is hardly surprising that mess results and that the demands for reliability differ when interactions are driven by the various management strategies of these four cultures (for details, see Thompson 1993; Thompson, Ellis, and Wildavsky 1990). We can see how the interaction of differing strategies works by returning to chapter 3’s example of overpopulation. For egalitarians, it is essential to reduce what they take to be rapid population growth and numbers. That way you reduce needs directly. They also believe that we must change what we take to be our needs, the very notions of development and growth, arguing that this is the only earth we have. Hierarchists, in contrast, believe it is essential to set limits:

In the hierarchist’s social construction, development is certainly possible but not everywhere. Development that strays outside the pocket of stability . . . will be unsustainable and will have to be identified ahead of time and guarded against. Indicators of sustainability, safe limits, thresholds, critical loads, carrying capacities, statutory assessments of the risks and benefits of new technologies, and a host of similar concepts and procedures are the means by which this vital sorting is implemented. (Thompson 1993, 24)

Mess and reliability professionals are, in terms of cultural theory, primarily hierarchists and thus unavoidably in conflict with the other three cultures’ approaches to managing needs and resources. Not only do these cultural differences influence what knowledge is and the scale at which that knowledge applies in the mess and reliability space, but they also influence the volatility in the tasks before managers and their perception of the options they have to respond to that volatility in terms of their performance modes.

Options and volatility, along with knowledge and scale, are not determined by culture alone. The organizations in which we work and those we interact with also differ in fundamental ways for reliability-seeking mess managers. The late James Q. Wilson famously identified four types of organizations in which we work (1989, 158–71). His typology has two dimensions, outputs and outcomes—each distinguished by whether or not it can be observed and monitored, and each of which is crucial for networks of mess and reliability professionals. “Outputs consist of what an agency does,” while outcomes involve “how, if at all, the world changes because of the outputs. Outcomes can be thought of

as the results of agency work” (158). For instance, the “outputs of police officers are the radio calls answered, beats walked, tickets written, accidents investigated, and arrests made. The outcomes (or results) are the changes, if any, in the level of safety, security, order, and amenity in the community” (158–59).

Outputs and outcomes vary in the degree to which they can be monitored and accounted for:

Outputs—work—may be hard to observe because what the operator does is esoteric (for example, a doctor performing a diagnosis or a physicist developing a theory) or because the operator acts out of view of the manager (for example, a police officer handling a family quarrel or a ranger supervising a forest). . . . Outcomes—results—may be hard to observe because the organization lacks a method for gathering information about the consequences of its actions (for example, a suicide-prevention agency may actually prevent suicides but it has no way of counting the number of potential suicides that did not occur); because the operator lacks a proven means to produce an outcome (for example, prison psychologists do not know how to rehabilitate criminals); because the outcome results from an unknown combination of operator behavior and other factors (for example, a child’s score on a test reflects some mix of pupil intelligence, parental influence, and teacher skill); or because the outcome appears after a long delay (for example, the penalty imposed on a criminal may lead to a reduction—or even an increase—in the offender’s behavior five years later). (159)

The two factors—outputs and outcomes—and the distinction between those that are relatively easy or difficult to observe and monitor result in four ideal types of organizations: “Agencies in which both outputs and outcomes can be observed; agencies in which outputs but not outcomes can be observed; agencies in which outcomes but not outputs can be observed; and agencies in which neither outputs nor outcomes can be observed. . . . I have called the first kind of agency a *production* organization, the second a *procedural* organization, the third a *craft* organization, and the fourth a *coping* organization” (159).

Policy messes are inevitable when the different organizational types connect under differing reliability requirements. Evaluators recommend sophisticated monitoring, evaluation, and assessment systems for a coping agency; outsiders insist that all best practices in craft agencies be evidence-based, with measurable outputs and outcomes. Discretion that professionals had is displaced by expert systems grounded in algorithms. And what better way to create a mess for policy than ramming the round peg of a coping organization into the square hole of a production agency?

Before the financial mess, many banks were taken to be production organizations when they were not craft organizations: Among other things, they produced interest on savings accounts, which were their outputs, enabling account holders to support themselves, which was the achievable outcome. Some of the underlying financial activities were complex and sophisticated, requiring great skill, but the outcome—we used the money for our livelihoods—was by and large observable and measurable. The financial mess was in large part about how some banks and investment firms became coping organizations—the messiest of Wilson’s four categories—when not procedural in orientation. Some outputs and outcomes were not observable or measurable because the “it” involved was ambiguous. Just under what conditions are “tier one capital instruments” bank debt, equity, or something in between (see P. Davies et al. 2009)? Just what is the price of an illiquid asset—is it determined by the market, auction, model, or bureaucrat (Hughes 2008b, 2008c; Scannell 2008)?¹⁰ Just when is a credit default officially a default? One response to all the coping was the demand of decisionmakers that banks be supervised and inspected more stringently. While some banks resisted what they saw as heavy-handed, day-to-day regulation, others have been more procedurally oriented in following bailout stipulations.¹¹

Mess intensifies and amplifies because professional operating networks frequently include all four types of organizations, rendering the task environment more volatile. The network for U.S. electricity grid operations includes production organizations (for example, the private generators), craft organizations (high-reputation engineering units in distribution utilities), procedural organizations (state and federal regulators), and coping organizations (public health agencies whose systems depend on reliable electricity). The financial sector is as rich and messy in its organizational types and networks.

Now place in the midst of these cultures and organizations the performance modes, in which operators perform differently depending on the volatility of their task environment and the options they have to respond with. That is, connect how these different cultures and organizations operate in terms of managing just in case, just on time, just for now, and just this way. When the performance categories are combined along with the cultural and organizational types just mentioned, we end up with the politics of higher volatility and fewer options.

From the perspective of this book, politics is better described heuristically as the nesting of the three sets of preceding typologies, one within another. Production and coping agencies have four performance

Just-on-time performance Production	Just-in-case performance Organization	Procedural Organization (performance modes not shown)	
Just-for-now performance	Just-this-way performance		
Craft Organization (performance modes not shown)		Just-on-time performance Coping	Just-in-case performance Organization
		Just-for-now performance	Just-this-way performance

Figure 6. Types of organizations and performance modes in hierarchist culture

modes, as do the two other types of organizations. This composite of differing organizations, each with their four performance modes, fits in turn into the hierarchist culture, as that culture is the most organizational and best captures the heartland of mess and reliability professionals.¹² The resulting hierarchist culture is not homogeneous. Rather, it consists of the interaction of production, procedural, craft, and coping organizations, each of which in turn, in order to be reliable, has to have recourse to the four performance modes of just in case, just on time, just for now, and just this way, as shown in figure 6.¹³

Out of this mix come higher task environment volatility for those

involved and fewer options agreed upon by them. The nesting of modes and organizations within a culture that is itself at odds with the other three means that knowledge and scale are rendered as complex, uncertain, disputed, and/or incomplete in all the respects that matter. When it comes to the dimensions of knowledge and scope of the mess and reliability space of professional activities (figure 3), macro design will invariably be populated by multiple, conflicting, and incomplete positions; patterns and scenarios connecting outputs and outcomes will be uncertain, complex, or in conflict; and just what is happening in terms of operator error may be known only to that operator. In like fashion, the nested model in figure 6 captures the difference between the ways many people, including experts, think bureaucracies should act and the ways they actually act. For example, to revert to the academic literature, the Weberian bureaucracy is the hierarchist production agency acting just in case and just this way, while the garbage can bureaucracy is the hierarchist's coping agency acting just for now or, at best, just on time.

Because the resulting volatility is higher and the options fewer, mess and reliability professionals often find themselves limited to working only in that real-time reliability of just on time and just for now, with the major risks of misjudgment and amplification of error that those conditions entail. (This is why higher volatility and fewer options should not be equated solely with just-for-now performance.) It is important to underscore that the limitations imposed by working with others from different cultures and different organizations not only increase the volatility but also circumscribe the agreed-upon set of options professionals have in responding to the volatility they face.¹⁴

We must be careful here, however, because even as the politics persist, nothing is static or unidirectional. Some options may increase, others decrease. In terms of figure 3, learning is taking place in the form of evolving better practices; the networked professionals add or drop patterns and scenarios from their repertoires. It is altogether possible that new networks or network members bring new options. This is an empirical question that cannot be settled a priori.¹⁵ The overall societal challenge under conditions of higher volatility is thus to ensure that the "fewer" available options are sufficient enough not only to avoid prolonged stays in just-for-now performance but also to keep managing flexibly just on time. That said, let there be no doubt about the overall consequences of the politics. They are the hydraulics that make it more difficult to preserve the good messes we have and to ensure that the bad messes we face do not get worse. Margins for error

have become tighter and the complexities to be managed within them more difficult, which make the identification of better practices and their evolution all the more important. I now turn to the major implications of this societal challenge and others for the professionals managing these systems.

SEVEN

PROFESSIONAL CHALLENGES

Many long-lived debates in public policy and management have been fought at the extreme hubs of mess and reliability: Market versus Hierarchy; Hierarchy versus Coordination; Coordination versus Regulation; Regulation versus Technology. We are told that, when it comes to high reliability of critical infrastructures, macro design should trump micro behavior (think: operator error); alternatively, micro behavior must drive macro design (think: self-organizing complex adaptive systems). If only we designed efficient energy markets, the grid would basically take care of itself; if only we had real-time metering in every household and business, the grid would basically take care of itself; if only we distributed multi-agent software to have the grid repair itself, the grid would basically take care of itself; if only we took shortcuts to reliability and got rid of all that *mess* in between, we'd be much better off. We might as well be talking about who's more likely to be in a Christian heaven, Plato or Aristotle.

If we keep thinking like that, our critical services will shift from a mess that can be managed to crises that can't. The societal challenges discussed above promise a grim enough picture for reliability management in a persistently messy political economy. Gerard Corrigan, the former head of the New York Federal Reserve and chair of the Basel Committee on Banking Regulation, warns that when it comes to a new financial regulatory regime, "the complexity quotient is now so great that the risk of the laws of unintended consequences taking over the process are very high. I wish that it were easier to get all the stuff out there and digest it but we have to be realistic" (2010).

We must be realistic, but in response to the reality that matters. Say you are on one of the upper floors of a skyscraper, looking out at the morning. That is Reality Number One: You are the observing subject looking on reality. After a moment, you realize that the spot in the distance is actually a plane headed toward you in the World Trade Center. That is Reality Number Two: You become the object of reality, in the grip of the real and no longer the observer.¹ There is, however, Reality Number Three. In this example, it is the reality of the air traffic

controllers on 9/11. Neither the observer of the first reality nor the object of the second, these professionals achieved the unprecedented without incident that day. They were instructed to land all commercial and general aviation aircraft in the United States—some 4,500 aircraft—and they did so (National Commission on Terrorist Attacks upon the United States 2004, 29). Without overdrawing the analogy, so too do we demand that our professionals “land” those water, electricity, transportation, and telecommunications services—and many other critical ones—every day without major incident.

It is one thing to recommend protecting mess and reliability managers and operators who are already here and educating others to succeed them. It is a much different assignment to address what reliability-seeking professionals should be doing in a world that draws them more and more into those uncharted waters where their unique risk-appraisal skills are no longer effective. How can they stay professional in this changing world? The short answer is that they need to rethink policy, management, and professionalism.

Rethinking Policy

Much of contemporary policy wants to be magic. I mean more than the magic of macro and micro solutions, with their one-way alchemy to success. Policy as practiced also has much to do with the conjurer’s misdirection. The policy directs your attention to one area, while the real action happens elsewhere. You focus on the hand of the policymaker when the other hand of professionals ensures that rabbits and hats go together. Without this misdirection, how could policymakers make things happen the way they want the rest of us to believe?

We were told by policymakers that we had to get the politics right: How could we have the society we need without getting the right political arrangements in place? Then we were told we had to get the economics right: After all, you can’t repeal the business cycle; so get the right economic arrangements in place and the politics will follow. Now we’re told that we first have to get the science right: Dummy, it’s politics and economics that have gotten us into this mess and will keep us there, unless we start from what best science tells us. But the same misdirection is still going on: European and American farm corporations continue to get their subsidies—whether that’s because agriculture is politically important, food is economically important, or carbon sequestration mandates it from high.

Many public policy issues deserve better than sleights of hand. Policy messes have to be managed without the sorcery of sweeping them away. Subsidies are a mess, but subsidy policy is not a policy unless its messes can be managed. This is true even if the only time the rest of us may be aware of those managers is when their management is under threat. Yet it is unmanageability that increasingly grabs the professionals' attention. Credit default swaps (CDSs) grew to an unmanageable size off the balance sheets of banks, and part of the financial mess has been the recognition that not enough management capacity existed to manage those swaps well (Dizard 2008; see also Tett 2009e). "The [banking] industry let the growth and complexity in new instruments outstrip their economic and social utility as well as the operational capacity to manage them," concludes the head of Goldman Sachs (quoted in Jenkins 2009). A sudden, inexplicable plunge in the stock market leads a government official to worry that "the market has outpaced the ability of the infrastructure to handle it" (quoted in M. Mackenzie and Sender 2010). From this perspective, why on earth would we believe policy creates management when the policy ensures that managers are not there at all or, if there, unable to realize the objectives posed by policy? You would expect that after 2008, the better management strategy for CDSs would have been to focus policy on filling the gaps or shortfalls in the requisite management expertise. Instead, the focus has been primarily on the swaps themselves (see, for example, FCIC 2011), while at the same time the CDS sector has become more concentrated and interconnected (Noyer 2009), and thus more intractable to being managed well. In fact, "most of the big US banks got bigger after the financial crisis" rendering them now "too-bigger-to-fail than before," according to the president of the Federal Reserve Bank of Dallas (quoted in Nasiripour 2012).

The important corollary has been raised at several junctures in this book: Arenas that contain no mess and reliability managers should be no-go areas for policy and policymakers. Why knowingly enter arenas that have no one there to manage the mess resulting from your entry? Another example is helpful: A recent permutation of the debate over the global carrying capacity has been the proposal that we should not produce carbon dioxide emissions that exceed an atmospheric threshold of 450 parts per million or lower (see, for example, McKibben 2007, 39). If adopted, the only thing such a design principle would ensure is all manner of unintended socioeconomic consequences across heterogeneous regions of the world, merely a scintilla of the costs of which would be borne by the proposal's proponents. No cadre of managers

exists or is being trained that could competently carry out such a design principle. No one has the skills or training to modify it in light of regional differences, to determine the real patterns its implementation would cause across the globe, and to translate these patterns into context-sensitive case scenarios.

I repeat: There is no one—and certainly not those who insist the standard should instead be lowered to 350 parts per million (see Hansen et al. 2008; Revkin 2009).² To adopt such a “policy” is to trick ourselves into believing it even qualifies as policy—that is, a course of action that can be managed with any kind of realism known to human beings (see Geuss 2008 on the importance of realism to what he terms “real politics”). To counter by saying that we have no choice but to manage to such a standard because “failure is not an option” is rubbish. It is precisely because failure is always “an option” that professionals manage as reliably as they can in order to prevent it. That in turn means they know the mess they are in, the practices that work to ameliorate it, and the specifics of how those better practices have to be modified—region by region, case by case. What should really scare us is that the total absence of such knowledge is the chief feature of history’s “desperate measures for desperate times.” (When you think about it, what better way, save nuclear war, to bring the governments of the world to their collective knees than geoengineering “solutions” like those that would engorge the skies with mirrors and the seas with iron, all because global climate change left humanity no choice—no alternative—but to be unreliable on unprecedented scales?)³

Rethinking Management

Some general, and even systematical, idea of the perfection of policy and law, may no doubt be necessary for directing the views of the statesman. But to insist upon establishing, and upon establishing all at once, and in spite of all opposition, every thing which that idea may seem to require, must often be the highest degree of arrogance.—Adam Smith (1759)

Instead of operating on the assumption that reliability depends on macro designers getting it right from the start, wouldn’t it make for better management by bringing critical service professionals into the planning and operational process from the outset? This way, so the argument runs, you reduce the chances of management error later on, because those doing the planning and managing would work together

from the very beginning. “Apparently you can get to the top [in banking and finance] without ever having experienced all these things that the people below you do,” the vice chairman of the congressional commission on the financial crisis concluded (quoted in Politi, Guerrera, and Rappeport 2010).

It should go without saying that program designers have prevented big mistakes by consulting managers and operators ahead of time. A closer look at the mess and reliability space, though, should disabuse the reader of the view that this is *the* standpoint forward. We can no more expect designers to distill principles from the unique knowledge bases and better practices of the professionals in the middle (between the macro and the micro) than we can expect those professionals to apply principles in an unadulterated form (by bypassing the middle). We can no more expect each micro operator to be representative of any better practice than we can expect the professionals in the middle domain to satisfy every micro operator out there. Remember: The reasons we need reliable mess managers lie in the risks and hazards posed by design—and by reactive micro operations from the other side—to reliability management under messy conditions.

To believe that macro design changes in light of actual micro operations is misleading in the extreme. Yes, we know of cases where scenario formulation feeds back into macro design (for example, when the weight of legal interpretation leads to eventual change in the law) and where pattern recognition feeds back into micro operations (such as when overwhelming public opinion changes an individual’s belief). But if you want design to learn from practice, that design has to be centered on professionals in the middle. “Maybe it is time to bring more private sector bankers with a practical understanding of markets back into monetary policy,” writes John Plender, a *Financial Times* columnist. “Poachers turned gamekeepers might teach the academic central bankers a bit of common sense” (2010a). Operational redesign, not macro design, is the name of this search and hunt, as networked managers skilled in pattern recognition, scenario formulation, and their translation transform the original assumptions of policymakers and lawgivers into reliable services. Operational redesign, to be specific, is the addition, subtraction, and adjustment of practices and scenarios within the professionals’ repertoire. The implications for regulation are substantial. Of course, regulations, once published, need to be altered in light of emerging better practice; otherwise, they’d be a wheelbarrow without handles, hardly fit for their purpose.

That said, improved macro-design principles *as* principles are desir-

able for mess and reliability management, three of which I will touch on here (Roe and Schulman 2008). First—as a matter of principle—context and time matter: as we have seen in this book, system knowledge has to accommodate local knowledge in order to be able to manage. Second—again as a matter of principle—every design proposal must pass the “reliability matters” test. Would the proposal, when implemented, reduce the volatility that professional managers and their networks face? Does it increase the options they can use to respond to volatility? Does it increase their maneuverability in responding to different, often unpredictable or uncontrollable, performance conditions? To be clear, the role of mess and reliability professionals in such a test is to assess and operationally redesign the policy and management proposals of senior officials. In principle, the test of efficacy is not “Have we designed a system that can be managed?” but rather “Is this a system we can manage to redesign?”

Third—as a final matter of principle—any design that compels operators to work for an extended period of time in a task environment outside their domain of competence cannot be expected to produce or sustain a system of reliable services. It is true that a crisis by definition compels professionals to work beyond the limits of the known, and even of the knowable—but management professionalism alone cannot keep that kind of coping under way indefinitely.

What precisely is the point at which designers and managers can engage with each other more productively? Return for the moment to the mess and reliability space. When macro designers and middle professionals meet, those consultations should be around the only real contact point between the two hubs in that space: design principles modified in light of local conditions as contingency scenarios (for principles as interpretative concepts, see McCormick 2007). The motivating question of such interactions centers on what one policy academic has called “implementation robustness” (Bardach 2005, 33–34): How can *that* macro design apply *here* in the face of these contingencies? The answer also includes an eye on modifying system-wide better practices for that local case at hand. Just as policy is not really policy unless it can be modified in light of its actual application (see Shackle 1969, 277), design should not be treated as design unless it is open to and can accommodate local contingency scenarios and better practices not originally planned for. Design that cannot be managed through operational redesigns is better thought of not as design but as surface pieties so void of content as to be outside any knowledge base for reliability with which humans are acquainted.

What do I mean by “contingency”? In 2006, Warren Buffett gave the Bill and Melinda Gates Foundation \$31 billion. Buffett was the first to interest Bill Gates in setting up a foundation—through the chance suggestion that Gates read a piece of conventionalized policy analysis. “Mr. Gates credited Mr. Buffett for encouraging him, in the early 1990’s, to read a copy of the World Development Report, put out by the World Bank, that analyzed poverty levels around the world, thus sparking his interest in philanthropy,” according to a *New York Times* report (L. Thomas 2006; see also Leonhardt 2007). When one adds the Buffett contribution to the Gates Foundation’s already large endowment, that World Bank report may be the single most important item ever produced by the bank, and that occurred by happenstance. Contingency matters; it need only happen once for it to be possible again.

If, as suggested above, a few macro-design principles for management are possible, what about the task of managing for better micro operations at the individual level? After all, we start in the workplace not as full-blown professionals but as learners at the micro level. “Human nature no where exists in the abstract,” the Scottish philosopher Adam Ferguson tells us, “and human virtue is attached, in every particular instance, to the use of particular materials, or to the application of given materials to particular ends” (1792, 2:419). Just what kind of individual psychology can we bring to the workplace that would make us better mess and reliability professionals? What psychological orientations enable the creativity, flexibility, and networking that are very much part of mess and reliability management? The literature offers at least one suggestion: Excel in improvisation; make do with what comes to hand so as to avoid worse.

In a favorite passage of mine, the Austrian philosopher and social scientist Otto Neurath compared an individual’s experience in the world to that of sailors on the ocean:

Imagine sailors who, far out at sea, transform the shape of their vessel. . . . They make use of some drifting timber, besides the timber of the old structure, to modify the skeleton and the hull of their vessel. But they cannot put the ship in dock in order to start from scratch. During the work they stay on the old structure and deal with heavy gales and thundering waves. In transforming their ship they take care that dangerous leakages do not occur. A new ship grows out of the old one, step by step—and while they are still building, the sailors may already be thinking of a new structure, and they will not always agree with one another. The whole business will go on in a way we cannot even anticipate today. (1944, 47)

Today professionals are out at sea, where returning to port for repairs is not possible; we repair the ship with what is at hand,⁴ tacking and improvising where necessary, and sometimes we even come out with something better than we had before or would have achieved by other means.

In a contingent world, real-time improvising in the face of what people cannot fully anticipate becomes its own version of the professional as a resilient self. (Or, from the other side, having designs that work as planned is only one of the many contingencies we prepare for.) Operators and managers are improvisers skilled at bricolage.⁵ Their management world looks considerably less like Theodor Adorno's totally administered society than the cluttered studios of the artists Edgar Degas and Francis Bacon, or those traffic jams in Lagos that street vendors capitalize on. It is a political economy, as we saw in chapter 1, in which clutter is used for differing ends depending on how the clutter has been sorted.

Adam Phillips helps us here. What he calls "the contingent self" is someone who makes use of the luck, accidents, and coincidences that come along (1994, 20) in the networks and domain of competence where he or she is working. Such improvising, particularly the just-on-time assembling of diverse options, is found in the real-time management of critical infrastructures and large sociotechnical systems. Professionals are eager to turn the mess of contingency into the management of reliability.⁶ This contingent self, to put it in different terms, looks in to the self and out to network relations. In much the same way, improvisation looks inward to one's flexibility and outward to all that interaction that comes with repairing the ship at sea—the to-and-fro or, in the original economic sense, the *tâtonnement* of negotiating.

This contingent improvisation comes with a decided twist, however. Our professional networks are, in an important sense, like the infrastructures that support us: Both are ways to protect ourselves. We need their help because we lack options and they provide them. But we do not want a network of professionals just to help manage reliably; we want the network to help us decide what really needs to be reliable in the first place. In formal terms, the network stabilizes the dimensions of the mess and reliability space and performance modes, so that the managers involved can reconcile the patterns and scenarios reliably and maneuver across performance modes as conditions warrant. Being embedded in a network of reciprocating professionals reduces the costs of transactions in mess and reliability management—not just because other professionals are helping you to be reliable, but also

because they are deciding what you and they need to keep reliable. Team situational awareness is a classic example of this reciprocation (Garbis and Artman 2004). To put it realistically, the network produces us as professionals; we know ourselves in relation to what the others in the network come to know about and expect from us. In this way, it is the network that improvises the manager. The reliable mess manager is both improviser and improvisation.⁷

It is worth pausing for a moment to ask ourselves: Who is the opposite of an improviser and improvisation? Improvisers not only think they are in the midst of a mess, they know it. What they do not know is how to get out of it other than by managing the mess with others. Their opposites, then, would be those individuals who know we are in a mess, know it has to be cleaned up, know exactly how to do that, and know that they alone are the ones to do it. We call these individuals without networks paranoiacs.

They are often us. How many times have we heard or said something like “If implemented as planned . . .,” “Assuming proper ethics . . .,” or “Given the right prices . . .”—thereby only demonstrating that we ourselves are deluded by such weasel words? “If implemented as planned,” when we know that is exactly the assumption we cannot make. “Assuming proper ethics,” when we know it is unethical to leave it at that without specifying just what those ethics are, case by case. “Given the right prices,” when we know not only that markets in the real world often do not clear (supply and demand do not equate at a single price)—and even when they do, their “efficiencies” can undermine the very markets that produce those prices (more below). All these givens end up little more than the magical thinking of a primitive people. We could as well believe that the surest way to heat the house in winter is by striking a match under the porch thermometer.

“How is it . . . that we still remain barbarians?” asked the German polymath Friedrich Schiller at the end of the eighteenth century. It is because many of us continue to assume superior knowledge that we actually do not have. “The paranoiac is the person who has really noticed what a mess we are in and knows that the only sense he is going to get is the sense that he can make. . . . The modern paranoiac has realized that since God is dead someone has got to be god. Someone has to know what is going on, and there has to be a something that is going on,” writes Phillips (2006, 268). The paranoiac calls for automatic, binding, and unchangeable rules, hardwired into law as if that were enough to propel us ahead toward where we must arrive. Reality Number Three indicates otherwise: “Outside the paranoid map there

[is] the mess of contingency, and the contingency of mess” (267)—that is, the world of chance, accident, and luck in which improvising professionals find themselves. It is this world that cultivates their sense of realism, which teaches that little can ever be finished and that a lot must be cobbled together with the competencies we have as a way of managing things, now and as a way of moving ahead.

Rethinking Professionalism

In the film *Dr. Strangelove* (1964), a darkly humorous example of failed management occurs when General “Buck” Turgidson warns President Muffley that planes containing nuclear weapons are about to strike inside Russia, due to an order given by a rogue general barely holding on to his sanity. When Muffley hears this news, he explodes at Turgidson, saying, “When you instituted the human reliability tests, you *assured* me there was *no* possibility of such a thing *ever* occurring!” In response, Turgidson replies, “Well, I, uh, don’t think it’s quite fair to condemn a whole program because of a single slip-up, sir.” Sadly, President Muffley is not the only one who has been shocked and awed by expert promises of perfectible reliability. How can professionals survive in such a world and still claim professionalism? To put it formally, how do you remain professional in a politics of higher volatility and fewer options so as to avoid dumbing down, prolonged deskilling, and the sheer idiocy of happy talk?

The worst thing that can be said about any professional is that he or she is naïve or unaware of his or her own naïveté. The professional is not indifferent to reality. It is unprofessional to operate in Reality Numbers One and Two, when the demands are for Reality Number Three. Working in the latter requires a professionalism that understands that the policy world does not fail because pattern recognition falls short of macro design. There is always a gap between design and practice when it comes to hard issues requiring reliable management. Effectiveness and professionalism are not measured by how close management can bring practice to design, but rather by how well pattern and scenario are transformed into reliable service provision. You insist as a matter of principle that less government and small public sectors are better. I counter with evidence that large public sectors are not inimical to increases in the growth of economic markets and labor productivity (Kearney 2002; Lindert 2004; Wolf 2005). But I cannot convert that empirical finding into a design principle, and you have not

shown how your principle need not be modified for the cases I am talking about.

The professionalism we have been discussing in this book is not without its limitations. Reliable mess managers run the risks of becoming complacent, misjudging the situation, backing themselves into a corner, and failing to secure compliance when it is needed most. Where mess and reliability professionals differ from the macro designer and street-level worker, who make comparable mistakes, is in the former's value pluralism of having to accommodate competing macro principles in the midst of conflicting patterns and context-specific scenarios (see chapter 3). This value pluralism means that there is no stable resting point along a gradient of formal to informal professionalism: From this book's perspective, macro design formalizes as a principle what professionals cannot help but treat more informally as localized contingency scenarios, while micro operations treat informally what professionals cannot help but treat more formally when they talk about emerging patterns and practices across cases. This can't but be a messy business.

The middle domain of competence demands a skill base that serves as its own form of realism when it comes to managing the risks of operating there rather than elsewhere in the mess and reliability space. The skills isolate the essential differences between good and bad mess management. Think of bad and worse management as gravitating to the corners of the mess and reliability space outside the domain of competence, while good and better mess management resides very much within the domain. It cannot be said often enough that within that domain, mess and reliability managers grapple with all manner of consequences of macro design and micro behavior—intended and unintended, conscious and unconscious, systemwide and local—in ways and with others that tie them together, strongly and weakly, contingently or not, as professionals obligated by law, regulation, or mission to provide services reliably.

What does this actually mean for rethinking professionalism? Foremost, when confronted with a policy mess, we look for better practices that we can modify in light of our local contingency scenarios. Such practices, to repeat, have jumped a higher bar in the midst of politics, dollars, and jerks that we too face in our own case (assuming those are the politics that continue to preoccupy you). This search for better practices should be a no-brainer, but sadly it isn't. To return one last time to the healthcare mess: If it is true, as we are told, that the United States spends roughly \$7,000 on healthcare per person each year while

the rest of the developed world spends \$3,500 per person and provides more universal healthcare (Peterson 2009), why wouldn't we hire those developed-world experts to draft our healthcare proposal?⁸ The last thing Americans should want to do on their own is design their federal healthcare system.

More generally, why would you assume that alternatives to the status quo do not exist, without first seeing what other people facing similar messes are doing or have done, from which you could learn something useful? Margaret Thatcher was dubbed "Tina," so frequently did she insist, "There is no alternative." The social and legal critic Roberto Mangabeira Unger argues that the dilemma people face today is "the dictatorship of no alternatives": "All over the world, people complain that their national politics fail to deliver real alternatives" (2005, 1). Nor is he the only commentator to make this point (see, for example, Runciman 2012). But if we actually looked "all over the world," we would find much by way of existing alternatives and practices potentially useful to our own management. One of the founders of pragmatism, William James, used to remind his audience that this philosophy is "the habit of always seeing an alternative" (quoted in Mustain 2011, 119). It is bad enough that management occurs without any guarantees, but why would we start out blind to what works?

There is no Mallory's camera to capture success or failure in our professionalism. (In 1924 two British mountain climbers, George Mallory and Andrew Irvine, attempted to conquer Mount Everest. No one really knows which man, if either, made it to the top, though people hoped that Mallory's missing Kodak would be discovered and provide the definitive answer.) We can produce no picture to demonstrate that our policy messes are being reliably sorted out. What matters is that we do not manage poorly when we could have managed better. That is the message of this book. A group of banking and finance professionals put it this way: "What matters most in order to make sense of reality (which is inherently non-transparent to policy makers and the public alike) and of policy makers' behaviour is a coherent frame of reasoning to interpret the subset of *relevant* information through *clear* messages" (Issing et al. 2005, 38). By this point in the book, I hope you understand that mess management is a coherent frame of reasoning.

So what in the end is expected of us as professionals? Clearly, a willingness to work under real-time pressures and know the difference between just on time and just for now is a start. Understanding the factors that pull you to just on time, as well as those that push you into just for now, is also important. A good grasp of how risk and ignorance

differ and what makes for Reality Number Three is just as significant. Never far away is a high tolerance for surprise and a genuine capacity to take advantage of setbacks. “What are we missing?” is always a good question to ask about any mess you and your network are asked to manage. In short, the better you and your network are at performing cross-scale, context-dependent, case-by-case analysis, the better off we all will be for your professionalism, given our political economy and the realism it requires of you. What this means, in practice, is that professionals have a strong aversion to macro designers or micro operators who insist on magicking a way to reliability. An article in the *Financial Times*, “Scientists to Face Legal Action over [Their] Bangladesh Water Survey,” guides us here (Tait 2003). The scientists surveyed the groundwater but did not test for the arsenic in their water supply. Many of our politicians and pundits have committed comparable offenses.⁹ They insist that the water is never purer than at the well-springs of uniform principle and individual experience—but they are paid to know better. The arsenic when it comes to reliability management is also at its strongest there and needs to be diluted with huge flows of more and different knowledge. The mess starts at the source, not downstream. To willfully ignore or otherwise dismiss this borders on the criminal. Even “acting in good faith” with respect to the law means more than behaving with a “pure heart and empty head” (Menn 2012, 5).

All of this is essential to appreciate if we are to determine whether the financial mess and its aftermath are being managed well rather than poorly, the topic to which we turn in the final chapter. First, though, allow me to summarize the argument with respect to the societal and professional challenges facing those who are or aspire to be reliable mess managers.

Summary of the Challenges Professionals Face

I see four challenges confronting professionals in policy and management today. They must manage better the complexity of the issues with which they deal; build up their analytic and management capacity for addressing the issues (most important, through their contact networks); capitalize more on diverse communities and stakeholders when doing so (here, diversity refers to cultures, organizations, and performance conditions); and operate in real time much more effectively than often has been the case (Roe and Lindquist 2003).

Caught as professionals are in a world of unavoidably multiple cultures and different organizations requiring them to work across multiple performance modes, they manage complexity by translating system patterns and localized contingency scenarios into reliable service provision. Professionals build capacity, both analytic and managerial, because working in the middle, between patterns and scenarios, depends on being connected and networked to others who can help identify, assess, and ensure reliable services. Since no one professional can have all the required knowledge, it's the network(s) you must look for.¹⁰ Making the most of diversity means engaging the other cultures and the other types of organizations in which you are networked, since although they increase volatility, they also offer the possibility of new resources and better practices. Last, the ability to operate in real time is imperative because of that increased volatility and the fewer options that are often at hand when working with multiple cultures, multiple organizations, and the networks that involve both. In effect, the four professional challenges center on managing the inevitable setbacks along the way and making the most of them by pulling the good from the bad.

What does this add up to? Most, if not all, readers have heard or said something like "the biggest problem we have is implementing policy." Actually, that's wrong. The biggest problem is to adapt better practices, where they exist, to policy and management issues faced locally, and to do that we must address better the four specific challenges just sketched. This entails a lot of hard work, but that work is more to the point and far more exciting than the junk mail that passes for much of present policy. Of course, there remains that illusion of policy as a mailbox in which we send and receive important messages, including from time to time unimportant ones. But have you noticed just how mismatched many free-standing mailboxes are and the houses they stand in front of, at least in parts of the United States? The mailbox is weathered, rusting, flaked, or chipped, while the house behind is much more interesting or cared for. Contrary to the illusion, many policymaking processes are in reality just such poor specimens of mailboxes—and who manages mailboxes anyway? They scarcely reflect, let alone match, all the busy, domestic life going on behind them, that domain honeycombed as it is with context and practices.

If professionals and their networks meet the four professional challenges, they will be in a much better position to make time to do the analysis and management they have been trained to do. I would go further. Not only can they free up time for more analysis, but meeting the four challenges also makes them better able to address that gap

between outputs and outcomes discussed in the previous chapter. The bold premise in direct macro-to-micro “solutions” has been that macro design produces outputs at the micro-operations level that lead to desired policy outcomes. Yet the gap between actual outputs and desired outcomes persists and even grows under conventional analytical and management approaches for our political economies.

The truth is that mess and reliability management can realize outcomes that macro design only promises. Network-centered decision-making, as we saw, can produce better impacts than a problem-centered approach, when the activities (outputs) undertaken become part and parcel of outcomes that those involved may not have originally planned for but end up knowing they require. This is especially the case when the contrasting problem-centered decisionmaking is reduced to just-for-now performance: “I’m only asking for a temporary fix here!” We have seen how network-centered decisionmaking could instead have led to more options-rich, just-on-time behavior under the same pressures of urgency. Participatory action research is full of cases of networks of community members undertaking activities that lead to new and more achievable ends than initially conceived (see Minkler and Wallenstein 2008). People come to know what they are able to analyze and manage in ways that matter to them when it most matters to them.

Finally, those terms “just on time” and “just for now” seem to smack of short-termism, don’t they? Nothing in this book, however, reduces to “short term trumps long term,” when it comes to being a professional. There is no argument here that “since nothing is going to end well, all we can expect from professionals is short-term relief.” Better practices, after all, emerge across both time and scale, and when drawing on and modifying those practices to manage the mess at hand, we seek to exploit an informational advantage commonly associated with both the longer term and the larger scale. In fact, you can see mess and reliability management in real time as a no-regrets strategy. No set of engineers can build a bridge to withstand the loads it must take once it is operational, unless that bridge can first take greater loads placed on it when it is being built.¹¹ Whether the long run can be guaranteed or not, it is best to manage reliably in real time, whatever the stage of development or operation. In fact, how is a reliable long run possible, if the short-run messes can’t be managed better now?

But to recognize such challenges means that the reader must look for and acknowledge them. You must also do the radical work of understanding how your survival requires the survival of messy sociotechnical systems and their reliability managers, without which most of us

would have few chances in life—let alone critical services when we need them. And just what is this radical work? President Dwight Eisenhower’s farewell speech in January 1961 is best remembered for his warning about the military-industrial complex. But he had another caution for listeners that night. The president warned about the “danger that public policy could itself become the captive of a scientific-technological elite.”¹² This is the elite that promises few surprises and setbacks along the way, since—not to worry—they know what they are doing. I can think of no more important policy mess facing our political economy than the challenge of managing this aroused priesthood and its biddable congregants.

These would be fine words with which to end, were it not for drawing out the implications of this chapter and the preceding ones for this book’s primary case study, the financial mess. I have beaten CEOs, regulators, and lawgivers about the shoulders, but when will we know it is time to stop? Just how will we know that the messes left us by the financial upheaval are in fact being managed well rather than poorly? I conclude this book with some answers.

EIGHT

HOW WE KNOW THAT THE POLICY MESS IS MANAGED BETTER

Several years after the 2008 meltdown, a senior investment officer of one of the largest pension systems felt compelled to ask: “What if the global financial crisis is not over?” (Dear 2011). Nor was he alone in thinking that the aftermath debt crises had their roots in the meltdown (Das 2011). To see if and how a policy mess is being managed well, let’s return one last time to the financial mess and ask: What would we be looking for to show that it’s being better managed?

First, we would have started to hear more about better practices emerging in the banking and finance sector, along with differentiated scenarios for modifying or applying those practices. We would also be hearing about subsystem scales of governance and management at which these practices actually work for the better. If and when this happens, regional or subsectoral banking differences will be said to matter greatly when it comes to adapting practices on the ground (see, for example, Beattie 2009). This means we wouldn’t hear the panic rhetoric of late 2008, when senior officials said that they had all the tools they needed to manage the systemic event. As the Federal Reserve chair Ben Bernanke told us in late 2008: “I strongly believe that we now have the tools we need to respond with the necessary force” (quoted in Guha and van Duyn 2008).¹ Only at the end of his tenure as Secretary of the Treasury did Henry Paulson admit that he and others had no such tools at the start of the crisis (Guha 2008b). Only in 2010 testimony do we find another federal regulator—Sheila Bair, chair of the Federal Deposit Insurance Corporation—stating unequivocally that “regulators were wholly unprepared and ill-equipped for a systemic event that initially destroyed liquidity in the shadow banking system and subsequently spread to the largest firms throughout the financial system” (quoted in Braithwaite 2010, 4).

When it comes to managing policy messes, no tool is a tool until it has been operationally redesigned by those who have alloyed system-wide practices into prevailing practice locally (see, as an example, the LCH, Clearnet and Depository Trust and Clearing Corporation example in chapter 4). Whether such translations have become widespread since

the financial mess remains an open question. Prices generated by computer models rather than historical prices continue to be a vital part of financial services in the United States, such as mutual funds (Kaplan, Merton, and Richard 2009). Credit default swaps, notwithstanding their documented shortcomings (van Duyn 2010b), remain the basis for ranking some European nations as riskier than “top” corporations (Oakley 2010). Credit ratings agencies are still taken seriously when they threaten to lower the ratings of countries that their errors helped send into financial free fall. Now that some developed-country bonds are no longer as reliable as they were in terms of providing that “risk-free rate” against which investors benchmark other assets (Hughes 2010), pressure has been growing for alternatives—including the rates associated with those credit default swaps that helped bring finance to its knees. In such a world, headlines about how the poor and immiserated will have to depend even more on discredited financial instruments—such as “Microfinance Group in CDO Scheme” (O’Connor and Grene 2009, 24)—do little to reassure us. “Fat tail” events may drive extreme financial change; it is another thing to ensure that the tails are obese. Yet such is what is happening after years of increasing the money supply through central bank buying of government securities and other securities under prolonged just-for-now quantitative easing (see, for example, D. Mackenzie 2012).

We will know the financial mess and its aftermath are being managed better when the role of regulation is rethought. The calls for this or that regulator of systemic risk in the financial sector have been insistent (see Dombret and Tucker 2012). Yet we have seen how the greater systemic risk lies at the inter-infrastructural level where finance interconnects with other critical infrastructures, most importantly electricity and telecommunications (chapter 2). No regulators exist for such intersections, and were they to exist, their real-time regulatory challenge would be amplified by orders of magnitude. Who is to monitor the impact of electricity and telecoms on finance, and vice versa? Who is to demonstrate that the polluter-pays model from the environmental sector would be effective if applied to the financial sector—in other words, making the financial industry pay for its mistakes as a polluting company is supposed to (Labaton 2009)? It is not credible that any regulator would be as skilled in real-time pattern recognition and scenario formulation as the operators in the critical infrastructures are, when it comes to managing the unforeseen setbacks and redesigning operations due to interactions with other infrastructures.

Above I discussed the principle- versus rule-based approaches to

regulation, noting that the latter reduces the regulatory discretion permitted by the former. But when regulators operate outside their domain of competence and in the absence of practice-tolerant policies and protocols, as in the financial mess (FCIC 2011), what is going on scarcely constitutes discretion. “Discretion,” to reiterate, is a property of the domain of competence and is required when policy is out of date with respect to prevailing practice or not structured to be sufficiently sensitive to local context. When policy exists but competence cannot, then “regulation” indeed deserves to be put in quote marks. Better, then, that regulators in the financial sector refocus their efforts toward protecting the mess and reliability professionals already present or nurturing those who are emerging.

Critics counter that the real problem is that regulation is always reactively late or simply unable to prevent the determined fraudster. If that is true, why then aren’t the psychiatrists and historians in charge of regulation? After all, they thrive on taking a second look, and they are rarely surprised when people and institutions prevaricate. My point here is that no amount of preexisting legal theory or regulatory law can substitute for practices evolving across cases that now exist, or for that deep knowledge and familiarity that contextualize law and regulation in real time, case by case. This means the financial mess, like any major policy mess, will be better managed when we observe, as an analogue to real-time ecology and real-time economics, real-time regulation on its way to becoming a full-fledged profession. Some of the first signs of this happening will be when far more finance economists and MBAs start taking banking and investment supervision and inspection far more seriously (see Masters 2012a).

What do I mean by “seriously”? All too often, the reliability of financial transactions has been treated as if it can be traded off against some service attribute like the efficiency of transactions. In fact, the reliability of critical infrastructures is a state condition without which there would be no markets. Economics assumes a theory of substitutability, where goods and services have alternatives in the marketplace; reliability, on the other hand, assumes a theory of nonfungibility, where nothing can substitute for the reliability without which there would be no market infrastructure for selecting among alternatives. What, indeed, is money without the reliable institutions that secure it as a means of payment, unit of account, and store of value (Münchau 2010)? Economists object by insisting “we pay for the level of reliability we get” (as if reliability were thoroughly fungible).² But somewhere in their line of argument, the same economists also insist on the neces-

sity of “secure property rights,” when what they really mean is that a hugely reliable infrastructure of contract law, insurance, and registration must be in place and “always on” (for example, de Soto 2012, 9). As the financial crisis showed (see, for example, Hughes 2008a), if we destroy the underlying reliability of market mechanisms, we end up with financial products that have no reliably determined price. Economists and business schools may have to put this acknowledgment of the seriousness of reliability in econo-speak—think of reliability as a public good, a positive externality (like education), an insurance premium that society pays for having its critical infrastructures work, a solution to network externalities, a hurdle fee that has to be met before performance and service are provided, or some other economic formulation³—but if they take it seriously, reliability management by professionals will have a better chance of being more effective in banking and finance.

We’ll know that the financial mess has been managed better when efforts are made to rebuild a sector that can be managed and that regulators can comprehend (see Krugman 2008b). Think of the worst thing that could happen in the electricity grid: Blackouts ripple through the system to the point that the grid collapses. When this happens, grid managers have to recover the system, line by line, and the actual sequence of the process is rarely predetermined. (Indeed, the probability of failure may well be higher in restoration than during “normal operations.”) Each real-time decision—this line rather than that line—has to be thought about carefully and by teams, as a mistake could mean having to start restoring the system all over again. The same is true with the financial sector. Yet “there are few initiatives to overhaul the ‘grid’ of the financial system,” according to the chief risk officer at a major international bank (Banziger 2012).

The financial mess has been managed better if and when we learn that the sector is in fact being restored bank by bank, firm by firm. This, in turn, puts the premium on working through each recapitalization initiative, one by one. What is needed for the postfinancial crisis, according to the former chair of the U.K. Financial Services Authority, is “a plan, country by country and bank by bank, to fortify the [financial] sector” (H. Davies 2011). The reassembly will be made easier, in part, because major areas of service infrastructure have been, up to this point of writing, bypassed in the meltdown (chapter 5). Other elements will be easier to reconnect as and when they are far less opaque and brittle (on the necessity for less impenetrable language in structured securities, see D. MacKenzie 2010). The reassembly will

have to be done in light of a few basic design and policy principles, but there will be no pretense that the financial recovery depends solely or even primarily on the path of policy or on that of principle. To recast this in the terms of our framework, we are looking to reassemble a financial system that can be operationally redesigned as performance conditions change. If this occurs, it will be a slow process.⁴ In such ways, new Basel accords or banking reforms are at best the start of the process, and at worst the misdirection of policymakers and reformers who prefer us not to know if or how their messes are to be managed.

We will know the financial mess is managed when there is more recognition and acceptance that the future of financial services is now. Alan Greenspan, as we saw before, told the Financial Crisis Inquiry Commission that the next financial mess will doubtless exhibit myriad new assets and unintended consequences that cannot be foreseen (Politi and Rappeport 2010). But if the Greenspan future is the mess we are in, then to change today's mess is to change that future. To believe that something out there in a future beyond our imagination could save us is to ignore the fact that we are managing for those very resources and alternatives in the policy messes we confront today. To manage is both to allocate scarce resources and to generate more or fewer options, more or less volatility. That is the central point of real-time economics.

This leads to my final set of points. We will know the financial mess is better managed when mainstream economics recovers from the part it played in the mess.⁵ I tell my students that policy analysis is indebted to economics for a useful three-legged stool: Opportunity costs are real, trade-offs drive priorities, and price is a coordinating mechanism when opportunity costs and trade-offs are accurate. Each leg is weak, but together the stool is strong. Passing itself off as best-of-show theory, modern securitized finance has befouled each leg of that stool.⁶

First to be stained was the notion that the opportunity cost of the forgone alternative makes choice difficult. The financial mess was what happened when money was decoupled from its opportunity cost, as in all the talk about "free money" (see, for example, Price 2009). Governments turned into ATMs from which cash was withdrawn at near-zero interest rates for well-beyond-zero returns. We were told that we'd be a fool not to dance when everyone else was. But there's the rub—deciding to take our chances on the floor or sit this one out differs from choosing whether to go to the dance or do something altogether different. In the former situation, I *could* lose what others around me get; in the latter, I lose the other thing I *would* have gotten. The dance was always a gamble; no forgone alternative ever is, or there wouldn't be such a thing as an opportunity cost.⁷

Second to be soiled by mongrel financialization was the notion that trade-offs drive priorities. Opportunity costs revolve around choosing this versus that, but trade-offs are rarely only either-or; they usually also involve having to choose enough of each—enough guns and butter, because you cannot have it all. The unhinged view leading up to the financial mess, however, was: “You can never have enough money.” Here, any amount of money we have is the burning reminder that we can never have enough. Thus Canadians are derided for the very same thing they were praised for: Their prudent behavior in the financial mess has meant that they “missed out” on making more money by not buying up all those delinquent banks in the United States (see, for example, Cyran 2009). If that is true, then we end in the deepest irony, a banking and finance sector in crisis because there is simply too much money around to be managed reliably. If the point is that financial regulation can always be circumvented, is that a failure of regulation or of having more money than could ever be regulated?

The third leg of the stool, which is just as tainted as the other two, is the notion of price as coordinating mechanism. When money is unhinged from opportunity cost and trade-offs are reduced to the “priority” of never, never, never having enough money, price ceases to coordinate behavior, be it for allocation or production. If the financial mess was about anything, it was about the difficulty in pricing subprime mortgages, mortgage-backed securities, credit derivatives, credit default swaps, and other instruments. No small number of mark-to-market assets ended up illiquid and unpriceable, and, as we have seen, the opportunity cost of those illiquid assets was the very reliability of markets that had to be forgone whenever these assets were “transacted.” Or, to put this in a positive register, we should have learned from the financial mess that the statement “most markets are mostly efficient most of the time” cannot be treated as a starting principle. It is at best an emerging generalization to be based on a wide range of empirical cases that, in turn, will have to be modified for new cases.

How will we know when this three-legged stool is fit to use again in finance and banking? The answer is to look for the recoupling of opportunity costs, trade-offs, and prices to economic choice. The virtue of a levy on individual financial services transactions (for example, a surcharge or Tobin tax on major bank transactions) is not that it would fund financial recovery in the next collapse (that could indeed encourage banks to take more risks, because they know that such a fund will bail them out later). Rather, it is to give financial transactions an opportunity cost they may not have and without which there would be no moral hazard to worry about or correct.⁸

If recoupling is the focus, then we must look to those economists who are willing and able to detail a new kind of market failure hitherto largely undiscussed. The majority of economists will tell you there are four types of market failure: public goods, externalities, asymmetric information, and market power. In this book, I have spent considerable time discussing an important hybrid: the failure of efficient markets to value or price fully the reliability required for undertaking market transactions. If, for example, algorithm-based high-frequency trading strategies accelerate “flash crashes” in the very market infrastructure that those strategies help to make more efficient, then the price of maintaining this infrastructure reliably has to reflect more than the efficiencies of those trading strategies. Otherwise, *efficient* markets can become their own form of market failure. Some economists already recognize that models of efficient markets undermined the infrastructure professionals needed to ensure reliable financial markets. Using terms introduced earlier, the University of Chicago economist Raghuram Rajan concluded that “modeling that took the plumbing for granted ensured the breakdown of the plumbing” (2010, 117).

How does this actually work? If it is, as *The Financial Times* assures us, that “mark-to-market accounting is the price that banks must pay for a securitized credit system” (Lex Column 2008b), then better management includes the costs of relying on this kind of accounting. The debate over the structure of derivative clearinghouses—ranging from quasi-public utilities to for-profit companies—reflects just this concern to ensure that the full costs of “too big to fail” are priced from the outset (Grant 2010).⁹ This is also the case for the other avatar of financial efficiency—the just-on-time liquidity of overnight banking. When such overnight banking becomes the same road to the just-for-now, last-resort financing of linchpin institutions that would otherwise fail (as in the case of Bear Stearns), then the efficiency of one financial market undermines the wider financial market (see, for example, Goldstein 2008)—and without markets, what sense does it make to correct for the other four types of market failure?

Perhaps there is no better example of this fifth, hybrid type of market failure and its effects than the U.S. flash crash of May 6, 2010 (Bowley 2011; for an evaluation of the flash crash, start with Commodity Futures Trading Commission and the Securities and Exchange Commission 2010a). In this case, market transactions happened so fast and were so numerous under conditions of high-frequency trading and collocated servers (to reduce transaction times even further), that there came a point when no liquidity was left to meet proffered trans-

actions: “Indeed, even in the absence of extraordinary market events, limit order books can quickly empty and prices can crash simply due to the speed and numbers of orders flowing into the market and due to the ability to instantly cancel orders” (Commodity Futures Trading Commission and the Securities and Exchange Commission 2010b, 2). Once liquidity emptied from the market, so too went price discovery: Markets can’t clear because efficient market transactions have ensured that there is no market to clear. Increasing efficiencies, in other words, can put market design and structure at risk: “Liquidity in a high-speed world is not a given: market design and market structure must ensure that liquidity provision arises continuously in a highly fragmented, highly interconnected trading environment” (2). If such assurances are not provided—and the federal report on the flash crash recommended better pricing mechanisms as an important corrective—market efficiency and market failure are perversely and positively correlated. None of this was made any easier by the deliberate coupling of a highly volatile derivatives market to a more stable equities market; if the reliability of market infrastructure were a priority, you would have expected buffering or decoupling to have taken place instead.

An economist might counter by asserting, “*Obviously* the markets were *not* efficient or complete because *the full costs of reliability* were not internalized.” True, a great deal more can and must be done to bring reliability into the cost equation. Paul Schulman and I have spent a considerable amount of time developing indicators showing that reliability can be better reflected in the real-time price of a critical service and the job descriptions (and thus the salaries) of those doing the real-time management (Roe and Schulman 2008). However, there is a limit to what can be done along these lines. Reliability mandates on banking and finance pose nonfungible limits. There is a point after which the safe and continuous provision of a critical service cannot be traded off against cost or any other attribute of the service without undermining those very trade-offs. In fact, the flash crash demonstrates what happens when reliability is treated as fully fungible with those attributes of cost, speed, and convenience. Nor did such concerns about costly trading, software, and computer malfunctions stop with the 2010 event, worries over which continue as well (Demos 2012). After an increased number of computer glitches on the various exchanges, a well-known industry expert reported in the *New York Times*: “In the race for speed, however, some industry experts say reliability has been sacrificed.” How? “The markets basically gutted their high-cost, nonstop infrastructures for very fast, low-cost infrastructures” (Popper 2012).

Moreover—and this is a crucial point—when efficient markets work to undermine market infrastructure, we must shift the concern for moral hazard as well. The more the managers of these infrastructures keep their systems reliable under increasing demands, the more the infrastructure and managers are expected to manage ever more demands reliably—until the system in question crashes, or its elements are decoupled from the volatility. This is the dynamic described in chapter 6’s five propositions. Too many people have incorrectly seen the major moral hazard as banks and investment firms becoming more risk-taking and less resilient because of easy credit and bailouts. A more fearsome moral hazard, however, lies in senior executives and officials taking predatory advantage of their organizations every time its middle managers and operators continue to be reliable in the face of their predations. That is the sure road to destroying the middle managers’ capacity to be resilient and anticipatory at the same time (for more on the role of executive management failures in modern-day disasters, see Perrow 2007). We would do well to remember that the answer to weak regulation is *not* efficient markets that undermine the infrastructures for reliable markets and their regulation.

Resilience and anticipation are core to mess and reliability management in the same way that productivity is to economics, and for the same reason. Improving the resilience and anticipation skills of real-time professionals is by and large the way we improve their productivity and the management of the critical service or infrastructure in question. Although improvements in labor and capital productivity are measured in increases in output, improvements in resilience and anticipation among real-time professionals are measured in terms of sustaining the reliability, however messily realized, required for those output increases.¹⁰ That kind of productivity is important for mess and reliability managers, if only to reframe inevitable setbacks as occasions for subsequent learning and improved outputs. Productivity in real-time economics has much more to do with operational redesign by competent professionals than it does with stumbling on innovation as an unintended consequence of having been thrust into unstudied conditions. As we have seen, designers’ innovation^{positive} all too readily turns out to be the managers’ innovation^{negative}. After all, isn’t one of the major points of the financial mess that too much innovation led to too much human and organizational error, thereby undermining productivity across multiple factors?

The ethical implications of treating resilience and anticipation as productivity are subtle but altogether visible for those who wish to see.

The priority given to the resilience and anticipation in reliably operating within the domain between system patterns and localized scenarios means that a network's sense of fairness shifts from universals at the macro level and individual morality at the micro level. Instead, it focuses on applying and modifying what are today taken to be better practices to the context in which we find ourselves with the case at hand. The French historian Pierre Rosanvallon made this point at length in *The New Social Question*:

As society gains more knowledge of its differences, a considerable change in the perception of fairness tends to be produced. . . . The increased knowledge of the differences between individuals and groups strains the bases of the social contract. If some know they will be spared some costly serious illness, will they agree to continue paying the same contributions of health insurance as those who are genetically condemned to develop that affliction? In an unpredictable universe, the essence of justice is *procedural*; it is bound up with the search for a universal rule. Our increased knowledge of inequalities and differences makes that definition of justice problematic. . . . As long as society is perceived simplistically, as structured into classes assumed to be homogeneous, the issue of justice can be formulated globally. But when that condition disappears, society appears as what it is: an unstable tangle of individuals and multiple economic, social and professional classifications. (2000, 29–30, 34)

A mess and reliability professional cannot be realistic about the tangle of such work without adapting what has been found to be fair in like situations, given that the default to totalizing universal principles or individual exceptionalism would only make the messes worse. This sense of fairness arises out of the network in which professionals find themselves confronting the morphing challenges of policy and management. Part of this is the value pluralism of having to reconcile multiple macro principles in the midst of competing trends, practices, and context-rich scenarios. To my mind, this is pluralism worth having because it actually works—thankfully without the perfect reliability that leaders promise but cannot deliver, and with more mess than some like when it comes to fairness. Why thankfully? Because if relied on too much, even the most principled theory, and not only the most unprincipled politics, will undermine mess and reliability professionals and their networks. You do not need to be a Mussolini or an Eichmann to want the trains to run on time in our political economy, nor can we expect any political theory to secure such reliability for us.

And who, one last time, is this “us”? I pointed out how the skills of

mess and reliability professionals for managing the probable (in terms of patterns and scenarios) also make them adept at identifying and assessing the possible. The “we” of this book are also the ones who work and manage their way to possibilities in the arenas in which we find ourselves. The crux of this challenge is captured in a beautiful passage by John Berger, the essayist, novelist, and painter:

The other day I saw a lorry carting blocks of stone, white in the sunlight, from the quarries on the other side of the village. On top of the blocks was a wooden box with tools in it. On top of them, carefully placed so that it should not blow away, lay a sprig of cherry blossom. In the rockface is buried the promise of dynamite: in the dynamite the promise of space: in the space grows the promise of a tree: in the core of the tree the promise of blossom. That was the relationship between the spray and the blocks of stone on the lorry. (2003, 213)

That too is the relationship we have to possibilities when we are working the rock face of mess and reliability. It is here where policy, management, and politics metamorphose under heat and pressure, and where their possibilities have to be managed. Some call this intersection of practice and possibility, hope.

ONE Introducing Policy Messes

1. On the search for narratives to make sense of the financial mess, see Yergin 2009 and Crook 2010.

2. A “wicked” problem has features that render it intractable to conventional policy analysis (see, for example, Rittel and Webber 1973). First, there is no definitive formulation of a problem and thus no definitive solution. Each wicked problem is a symptom of other wicked problems and is therefore difficult to parse and explain. Accordingly, the boundaries of problems and solutions are under dispute, because the problems are so interrelated and unpredictably so. Whatever solutions the decisionmaker generates are produced in the absence of any clear test to determine if they are really feasible or effective over time. The financial meltdown has been termed a wicked problem (see, for example, Stapleton 2010).

3. When Kingdon writes of the “messiness” of public policy and agendas, he allies it with “accident, fortuitous coupling and dumb luck” (1995, 206). Similarly, Stone writes, “Politics is ‘messy,’ ‘unpredictable,’ an ‘obstacle course’ for policy, and ‘a hostile environment’ for policy analysis” (2002, 376). Management experts refer to the “messy process of experimentation, failure and feedback” (London 2003).

4. Although not concerned with policy messes, Abrahamson and Freedman (2006, chapters 3 and 5) list many kinds of mess and messy people found in daily life (for another popular view, see Rigby 2008).

5. “Far from promoting ‘dispersion’ or ‘diversification’ [financial] innovation has ended up producing *concentrations* of risk, plagued with deadly correlations” (Tett 2009d).

6. Martin Feldstein, a Harvard economist and advocate of competitive markets, wrote about the issue of pricing toxic assets associated with the subprime mortgage crisis: “The Treasury’s preliminary idea was to use a ‘reverse auction,’ a method that works well when used to buy a single homogeneous security (like a firm buying back its own shares). But that is not feasible for buying the impaired securities, because of the enormous variety of underlying mortgages and of the almost limitless number of different derivatives based on those mortgages. The buyback will therefore involve a large number of arbitrary valuation decisions by the Treasury staff and their investment-banker advisers” (2008).

7. The 2008 financial mess and its sequelae have done little to dampen Shiller’s promotion of financialization and innovation (Shiller 2012).

8. A very different kind of leader, U.S. General David Petraeus, said we should be content with a “messy, sloppy status quo” in Iraq (quoted in Dombey and Savastopulo 2009).

9. Mitroff, Alpaslan, and Green suggest that problems in crisis management are, in part, “*relatively structured messes* that have been extracted from potentially highly *unstructured messes* for the purpose of *better managing* current and future messes” (italics in the original; 2004, 177).

10. Those wishing to pursue Ackoff’s insights on mess in business and related fields can start with Ackoff 1999 and Ackoff and Rovin 2003. Those interested in the role of mess in other fields should begin with mess theory in literary criticism (Trotter 2000), rubbish theory in anthropology (Thompson 1979), or the heap paradox in philosophy (that is, at what point does, say, a heap of sand cease to be a heap, as grains of sand are removed one by one? See Williamson 1994).

TWO When Reliability Is Mess Management

1. “There is no agreed [on] definition of financial stability, except perhaps to identify it with the stability of the banking system, itself sometimes defined simply as the lack of collapsing banks” (McDonald 2009).

2. It appears that bust and burst are to be expected from economic booms, as happened with export-driven growth in Asia and Latin America (Klein and Cukier 2009; Rodrigues et al. 2009).

3. Contrast this state of affairs with the earlier stability that led to, well, stability. By ensuring stability, the integrated utilities for pre-deregulation electricity and telecommunications—and banks—actually continued to be reliable. No wonder a nostalgia for banks as utilities, divorced from their latter-day casinos, has grown (see, for example, Wolf 2008b).

4. This section builds on research reported in Roe and Schulman (2008) with revisions in light of subsequent work.

5. One former head of a major private banking unit argued that “all utilities need in-built redundancy and careful balancing. Without that margin of safety in electricity, for example, the lights may constantly go off. Redundancy and balance are . . . exactly what the promoters of [the Basel II Capital Security Accords] removed from the financial system” (quoted in Plender 2009a). So, too, for European capital rules, hammered out after the failure of the Basel Accords during the financial meltdown: “But the real risk . . . is that people start to believe too much [in these new models and rules] and drive out redundancy, or margin for error,” said one financial analyst (quoted in P. Davies 2009). However, some banks increased reserve margins above what regulators required to ensure positive redundancy: “The traditional ‘Swiss finish’ whereby the authorities added 20 per cent to whatever number the Basel calculations delivered for their big banks, has been replaced by a doubling of the Basel number. This might be characterised as the ‘think of a

number and double it' approach to setting capital, but may be none the worse for that" (H. Davies 2009).

6. For a popular account of how experts rapidly sort through a great deal of clutter to discern patterns that matter, see Gladwell 2005. The ability to assemble an option or response through different pathways may be a cognitive feature of the brain (see, for example, Edelman 2007, 1105).

7. The presence in financial markets and on trading floors of what I am calling here just-on-time performance has been well documented (see Knorr Cetina and Bruegger 2002). Zaloom reports one trader saying: "Just at the right time, I mean literally it was within a second, a split second. I literally caught a little pause in his offer where he was just kind of looking in all directions. I just happened to jump and bid and scream at him literally—I mean I'm not even going to say tenths of a second—I'm going to say hundredths. . . . If I didn't jump a foot and a half off the ground and bid fours at that guy just as I did and the way I did it, he wouldn't have seen me" (2006, 150). Other cases of just-on-time performance can be sedate by comparison: "It's day by day, hour by hour," said one participant in a case study of public-private collaboration in regulating derivatives (Faerman, McCaffrey, and Van Slyke 2001, 378).

8. For a different case, see Wood 2009. For more on bank nationalization and beyond, see Boyarchenko and Levendorskii 2009.

9. Legal reservations have been expressed about other developments in the financial crisis, such as then-Secretary of the Treasury Henry Paulson's requirement that the CEOs of nine major financial institutions sign a document permitting government equity participation in their firms (see Poole 2008). Even less salubrious examples may include the 2012 LIBOR scandal, which raised issues of "underreporting of rates" with respect to the London Interbank Offered Rate during 2007–8 (see Plender 2012 for what could be some just-for-now features). Other legal questions have been raised, for example, concerning specific Federal Reserve interventions (Hubbard, Scott, and Thornton 2009). Even judges were accused of not following foreclosure law due to the exigencies of the financial crisis (see, for example, Efrati 2009).

10. "A clearing house stands between two parties to a trade, guaranteeing that a transaction is completed even if one party defaults. The lack of such a mechanism in most of the OTC [over the counter] markets prior to the Lehman Brothers default was one reason why shockwaves were sent through the financial system" (Grant 2009d).

11. To put this in perspective, "financial services account for 8 percent of [U.K.] gross domestic product, which is similar to the US and much less than Singapore or Hong Kong" (Plender 2009b). Others put U.K. financial services at about 12 percent of its GNP (Brittan 2008); banking assets are a considerably higher percentage of GDP or GNP, however (see, for example, Wolf 2010). As for the United States and using a different measure, Benjamin Friedman reports that the "share of the 'finance' sector in total corporate profits rose from 10

percent on average from the 1950s through the 1980s, to 22 percent in the 1990s, and an astonishing 34 percent in the first half of this decade” (2009, 42).

12. Note again the importance of electricity and telecom in a cross-infrastructure perspective. According to the TNO summary: “The energy sector initiates more cascades than it receives. Interdependencies occur very infrequently. . . . Fixed telecom disruptions affect ATMs and electronic payments (financial sector), . . . governmental services, and internet and telecom services. Within the energy sector, most dependencies (61) occur between power generation, transmission and distribution” (Luijff et al. 2008). Using an earlier and different database, Zimmerman (2004) also found that disruptions in electricity and gas, water, and roads are more likely to generate cascades in other infrastructures.

THREE The Wider Framework for Managing Mess

1. The term “reliable mess manager” is shorthand for the more formally termed “mess and reliability professionals.” They are those reliability-seeking managers and operators as described by James Q. Wilson (see Wilson 1989 for a fuller discussion of the latter categories). For our purposes, these managers are those who specifically provide reliable critical services in ways that require them to manage messes in the process.

2. I thank Paul Schulman for the basic framework here, though he is not responsible for my adaptations and extensions. This section’s discussion builds on earlier research work in Roe and Schulman 2008, but with some substantial revisions. For a review of the research on which this section is based, see Auerswald et al. 2005, Roe et al. 2002 and 2005, Roe and Schulman 2008, and Schulman et al. 2004.

3. The focus is on the mix of knowledge, as there is no single gradient between deduction and induction. Such intermixed knowledge used in managing reliably is related to the familiar topic known as “the reliability of knowledge.” The degree to which information is reliable depends on how uncertain, complex, incomplete, and disputed it is; in other words, just how messy is that information. Some critical services, including those in finance and banking, are so knotted together with the reliability of information that the two are difficult to untangle.

4. See Schell 2008 (231).

5. In the presence of large amounts of data and detected signals, Sull and Bryant ask: “How can managers make sense of this deluge of information? The task is primarily one of pattern recognition” (2006). In case it needs saying, pattern recognition as well as scenario formulation proceed both consciously and unconsciously (for a fascinating discussion on the importance of non-conscious human processing of pattern recognition, see Grigsby and Stevens 2000, chapter 12).

6. Recognizing patterns and formulating scenarios are rooted in the evolu-

tion of the human brain. What some psychologists call contextual memory, for instance, is an evolved responsiveness both to site-specific cues and to the piecing together of those and other cues (Marcus 2008, 18–39).

7. Speaking of the better coordination of anticorruption investigations and regulation, one observer concludes: “Officials know each other’s phone numbers, they talk and meet frequently . . . I see [a recent statement on antibribery investigations] as a formal acceptance of many of the previously informal techniques and thus as a sign of convergence” (quoted in Chung 2009).

8. The real-time nature of the translation exercise has been long understood (see, for example, Hayek 1945). I thank Paul Schulman for pointing out this work to me.

9. In the words of the finance economist Avinash Persaud: “Many politicians and watchdogs think of risk as a single fixed thing inherent in instruments. . . . But risk is a chameleon: it changes depending on who is holding it. Declaring something safe can make it risky and vice versa” (2009, 9).

10. Street-level workers “do not tell stories about efficiently implementing public policy; they tell stories about using policy and the system to serve individuals” (Maynard-Moody and Musheno 2003, 49).

11. An earlier version of the following discussion appeared in Roe 2007. This section represents a considerable rethinking of that earlier case study.

12. The well-known ecologist Stuart Pimm and his colleague Jeff Harvey criticized Bjørn Lomborg’s *The Skeptical Environmentalist* as follows: “The text employs the strategy of those who, for example, argue that . . . Jews weren’t singled out by the Nazis for extermination” (quoted in Brander 2002, 973).

13. There are also regional differences in other areas with respect to global climate change. “In Europe, governments are implementing the Kyoto Protocol on climate change by customizing it to local and regional needs,” reports an informed observer. “Meanwhile, governments elsewhere are also developing their own locally tailored trading systems. The authors of the Kyoto Protocol [in contrast] envisioned a single global trading system with a single price” (Victor 2006, 100).

14. The long-term horizon has in fact been key to the comparative success of investing in timberland (Boyde 2011).

15. The complexity of international and regional globalization should not distract one from the sheer complexity found at lower scales of analysis. In the mess and reliability space, the “system” could as well be a corporation or organization that operates transnationally. For example, Citigroup, damaged in the financial mess, had 16,000 offices across some 140 countries in 2009 (A. Lee 2009). At the time of its collapse, AIG was an organization of more than 4,300 legal entities with 116,000 employees and operations in 130 countries (Felsted and Guerrero 2008; Morgenson 2008). Its collapse is said to have started within just one of those entities, a 377-person unit in London (Morgenson 2008). So too elsewhere: “At Royal Bank of Scotland, with 170,000 employees around the world, the business was crippled by activities that more than 169,000 of them

did not know about and were not engaged in" (Kay 2009b). Nor is any of this new. In 1998 the collapse of a single hedge fund firm, Long-Term Capital Management, nearly brought a good deal of the U.S. economy down with it. In the words of a senior *New York Times* financial columnist, "the notion that a private hedge fund with but 16 partners and fewer than 200 employees could cause lasting harm was never truly examined" (Lowenstein 2008).

16. Alexander Hamilton, the first Secretary of the U.S. Treasury, argued that government executives had to fulfill duties that were so numerous and engaged so many other people that these tasks could never be fully specified in any legislation. Because his explanation closely approximates what I have described as networked professionals, I quote at length from a letter by Hamilton to William Heth, dated June 23, 1791: "My opinion is that there is and necessarily must be a great number of undefined particulars incident to the general duty of every officer, for the requiring of which no special warrant is to be found in any law. . . . If it be said the law should then require this [or that], I answer that the detail would be endless. And surely it would not answer in respect to any officer that to say he must do *whatever* he is required to do. And if all that he is to do is to be defined the Statutes of the United States must be more voluminous than those of any Country in the world. . . . Consult, my Dear Sir, the Code of any nation whatever and examine the practice in relation to the point in question and you will find there is no law providing for a thousandth part of the duties which each officer performs in the great political machine & which unless performed would arrest its motions" (Hamilton 1965, 499–500).

17. Nonacademic summaries of the unique knowledge, however, are many. A good one that overlaps with points made here is McPhee 2006 (57).

18. Let us start with some statistics about the mess in which African American men find themselves in the United States:

- "Black Americans, a mere 13 percent of the population, constitute half of this country's prisoners. A tenth of all black men between ages 20 and 35 are in jail or prison" (O. Patterson 2007, 13).
- "Something like one third of our young African American men between 18 and 25 are now connected to the juvenile justice system or the federal justice system. They're on probation, they're in jail, they're under indictment or they're incarcerated" (Benjamin Barber in "Afro-America at the start of a new century," 2002, 100).
- "[Based on recent national statistics,] the most striking thing is the high portion of black men with zero *reported* income: about 18 percent of black men, compared to about 7 percent for whites and Hispanics" (Besharov 2007, 45).
- "After declining throughout the 1980s, employment rates of young, less-educated white and Latino men remained flat during the 1990s. Among black men aged 16 through 24, employment rates actually dropped. In

fact, this group's employment declined more during the 1990s (when it fell from 59 percent to 52 percent) than during the preceding decade" (Holzer and Offner 2004, 74–75).

- “The most dramatic, the most unfortunate of the several disastrous outcomes is the high rate of paternal abandonment of children[:] 60% of Afro-American children are being brought up without the emotional, economic or social support of their fathers” (Orlando Patterson in “Afro-America at the start of a new century,” 2002, 91).

If the figures about male African-Americans are true, then would we—that is, those of us who are tasked with managing this—not want to touch base with the nine-tenths who were not in prison, the two-thirds who were not connected with the criminal justice system, the four-fifths who did not have zero income, the nearly half who were employed, and the two-fifths who had not abandoned their children, in order to find out what they are doing right, so the rest of us could do things better?

FOUR Bad Mess Management

1. This may be one reason why the exercise of presidential prerogative in the face of unforeseen emergencies has never really been sufficient to establish precedent for future executive or legal action (Fatovic 2009, 56, 66).

2. In high reliability organizations, it is said that professionals are as reliable as their last case (Roe and Schulman 2008). So too for this example: Forensic science “is a business where you’re as good as your last case,” according to a former president of the American Academy of Forensic Sciences (quoted in Hamill 2008; for a book-length review of the issues, see Fisher 2008).

3. “Today, more than 30 per cent of all stock transactions in the US do not occur on regulated exchanges. Dark pools, less regulated trading venues that match anonymous buyers and sellers without displaying prices publicly, and other alternative trading platforms can play an important role by enhancing liquidity for certain investors, but these benefits come at the cost of less overall transparency and price discovery across the marketplace,” reports the CEO of NYSE Euronext (Niederauer 2010). By mid-2012, Niederauer had revised the figures upward: “Today, approximately 50 dark pools in the US operate largely outside regulatory oversight and, along with equally opaque internal trading operations by major brokers, handle nearly 40 per cent of daily trading volume. For more than 1,200 widely held equities, more than 50 per cent of trades now occur ‘in the dark’—nearly a 150 per cent increase over the past two years” (2012).

4. Nor is this the sole example of a sometimes messy reliability management under way in the midst of a crisis. As of this writing, the money market mutual funds have been stabilized through one of the Treasury’s bailout programs (Anand 2009).

5. Similarly, “Carl Linnaeus published the first edition of his classification of living things, the *Systema Naturae*, in 1735. Shortly thereafter, while having lunch with a colleague at the University of Leiden, he was in the middle of explaining the nature of his classification system, when the colleague stopped him in mid-explanation. A beetle had crawled onto the table, and the colleague wanted to know where this particular type of beetle fit into the classification system. Linnaeus examined the bug carefully, and frowned. Then he squished the bug with a thumb, flicked it from the table, and asked, ‘What beetle?’” (Trickett, Schunn, and Trafton 2005, 97).

6. “It is claimed that a Dutch colonial administrator, noting the higher price achieved by mace in the 17th century global commodity market, ordained that nutmeg trees in the Moluccas—not, after all, called the spice islands for nothing—should be uprooted to make space for the much more remunerative mace trees. It is cheering to know that bureaucracy has not changed much in 400 years. Had he been better informed, he would have realised that mace and nutmeg are from the same tree” (Leigh 2006, W11).

7. Better practices need not counter an individual bad practice; instead, they can counter a combination of bad practices (Guha 2007b).

8. It appears that unregulated OTC transactions were more profitable, on the whole, than many of those that went through regulated clearinghouses. A senior official in one exchange observed that “OTC clearing in general is a utility business” adding: “Nobody will make a lot of money out of it” (quoted in Grant 2009a).

9. Distinguishing between regional and global levels of analysis and management is especially crucial in responding to global climate change. For example, a *Science* article argues that environmental false alarms do indeed happen at the global level, but they nonetheless are a useful feature of global environmental action (Pacala et al. 2003). The authors go on to point out that the optimal number of environmental alarms occurs when the marginal benefits of environmental alarms are equal to their marginal costs. We must wonder, however, if the authors and like-minded associates have been hard at work on showing how that happy equation varies within and across *multiple* regions of the world and is confirmed by a regional analysis well beyond the United States alone.

10. Such figures are highly uncertain. For a first-pass set of estimates, see the special issue of *Foreign Affairs* (“The Next Pandemic?” 2005), particularly Osterholm 2005. See also Osterholm 2007. My comments are not a blanket condemnation of quantitative modeling or its potential usefulness for real-time operations. David King, a former U.K. science advisor, tells of the importance that modeling the 2001 foot-and-mouth disease outbreak in Great Britain had for decisionmaking: “Within a few days, we were able to advise the government, on the basis of modeling, that we had come up with a new control procedure. That was the cue for the prime minister to say, ‘Fine, we’re going with this.’ And it followed through. Within a few days, we’d switched

[the virus's] exponential growth to exponential decay, and the cabinet learned in real time that science could model an extremely complex situation and provide very robust advice for action" (2007, 1862). Notice that the modeling was successful because it produced a control protocol for the case at hand.

11. The importance of translation as a middle domain function, with its focus on translation of system patterns and specific scenarios—all networked—has been highlighted in *Science*: "Broader networks could expand linkages to other like-minded organizations. . . . We believe that more frequent robust exchanges of know-how among an expanding universe of public- and private-players would accelerate innovation and expedite the translation of knowledge about diseases of the poor while also reflecting national sensitivities, changing contexts, and the concomitant desire for economic growth" (Morel et al. 2005, 403). Certainly, one factor accounting for successful microfinancing schemes among the poor has been the network-based support that individual borrowers have received. On advances and constraints in community-based health care networks, see Adams 2010.

12. For an early slant on large-scale initiatives and the case for incrementalism, see Collingridge 1992. My thanks to Paul 't Hart for the reference.

13. The adjective "wide," modifying any distribution, denotes that uncertainty includes variability in human behavior with respect to the policy messes in which people find themselves: "Variability is an inherent characteristic of a population, inasmuch as people vary substantially in their exposures and their susceptibility to potentially harmful effects. . . . Variability cannot be reduced, but it can be better characterized with improved information" (National Research Council 2009, 6).

14. The acronym CPR is also associated with "common property resources," though not all common pool resources have property status.

15. Any way the mess and reliability manager looks at development, hunger is the priority (Sanchez and Swaminathan 2005). Even economists have found positive net benefit to hunger and malnutrition programs whose benefits well outweigh their costs (see Copenhagen Consensus n.d.). No one who understands mess and reliability really believes that we must first solve poverty and inequality if we are to reduce hunger appreciably, yet poverty and inequality receive more attention.

FIVE Good Mess Management

1. Consumption turns out to have been more equal than income, at least in the United States (Johnson 2002). That is to say, "there has been a large increase in income inequality but no concurrent increase in consumption inequality in the 1990s," according to an analysis of major data sets by Fisher and Johnson (2006). "One could argue that [Americans] don't care about inequality because the poor do pretty well in America, if one looks at the measure of consumption rather than income inequality" (Glazer 2003, 111).

2. Of course, one reason for differences among the uninsured could well be that the better off are healthier or have more assets than the poorer uninsured (for example, a number of the better off are young, or they have not signed up for Medicare or the Children's Health Insurance Program, even though they are eligible to do so). The merit of that explanation, though, is an empirical question, not one that can be settled a priori by any macro designer.

3. My thanks to Ian Mitroff for the insight.

4. Assessing the possible rather than the probable is far from Reverend Bayes's updating of probabilities; it is closer to the economist G. L. S. Shackle's work on surprise and the possible. People who are serious about mess and reliability should be worried about the prominence of Bayesian analysis (see Kőrding 2007). The notion that the brain has evolved into an optimal Bayesian decisionmaking apparatus rather than the kluge it actually is deserves to be examined more fully (Marcus 2008).

5. "Since the international system depends on the free, reliable and orderly flow of financial resources," writes Strobe Talbott, the head of the Brookings Institution, "failure to solve the current mess will stymie progress in those other areas—trade, climate and proliferation" (2008, 11).

6. One avoidance mechanism has been regulation. "'The oft-derided existing regulatory toolkit has been deployed more effectively in some jurisdictions than others,' concludes the Governor of the Bank of Canada" (Guha 2009b). For a perspective on how Australia successfully weathered the financial mess, see "The World Looks on with Envy" in the *Weekend Australian Financial Review* of September 5–6, 2009.

7. Other reliability-seeking examples merit attention: "Since 2000 banks there [in Spain] have had to make provisions for latent portfolio losses—those likely to occur but which are unrecognised by conventional accounting. This buffer takes the form of a reserve deducted from capital in good times and released in the downturn. It is calculated by comparing long-run credit growth in the economy with the current rate of credit growth. 'Dynamic provisioning' offers a better idea of profitability and solvency over time and helps prevent dividend increases in good times that might undermine banks' solvency. But the Spanish model is not compliant with global accounting standards. And it did not prevent a housing bubble as the macro-prudential approach battled a fierce monetary headwind—the European Central Bank's one-size-fits-all interest rate was lower than appropriate for a boom economy. Spain's banking system has nonetheless come through the crisis in better shape than most" (Plender 2009c). Note again that nothing is permanent about good messes, as banking complications arising out of the subsequent sovereign debt crisis in Spain indicate (Lex Column 2012).

8. Nevertheless, unless this is made easier, we can expect all manner of resistance to being your own healthcare manager—and for the same reason that it is difficult to be your own financial manager: "The idea that small savers are equipped to assess the risk associated with these [bond and invest-

ment] products by reading the small print [of their prospectuses] is absurd” (Kay 2010). Absurd it may be, but increasingly required it is.

9. The ability to consider multiple pathways and assemble options creatively appears to be a contribution of the frontopolar cortex to human cognition (see Koechlin and Hyafil 2007).

10. In addition to confirmation bias (selectively accepting and not attending to factors) and attribution error (fitting the situation into a positive or negative stereotype), any list of cognitive biases includes much more: “Most people are irrational in the ways they assess and manage risk. We overestimate the dangers of the rare and unfamiliar; we worry irrationally little about banal everyday dangers; we think situations where we have no control more dangerous than those where we think we have some, even though that is often wrong. So we worry far more about the dangers of train crashes than we do about car accidents, even though we are far more likely to die on the roads; we obsess about BSE or AIDS or other rare diseases more than we do about the prosaic killers, even though we would improve our life chances far more by giving up smoking, eating better diets and taking moderate amounts of exercise” (Honigsmann 2004; see also Pronin 2008). Making cognition even more complex, “consciousness rarely has access to the actual causes of our behavior, although it is capable of creating a plausible and adaptive model of reality that is good enough for most purposes and that seems to have been good enough for natural selection” (Grigsby and Stevens 2000, 262).

11. The work and research of Gary Klein and his colleagues (1998, 2003, 2009) show that decisionmakers rarely undertake formal deliberative analysis under conditions of urgency in a classic stepwise process. This finding is especially pertinent for mess managers operating under a reliability mandate. Their alternatives and options are typically limned in the initial conditions for problem definition, and what sets experienced decisionmakers apart from the less experienced ones is the former’s ability to see these alternatives from the outset—that is, they are better able “to size up the situation . . . [by recognizing] plausible courses of action as the first ones to consider” (G. Klein 1998, 95). Much depends on the technical system(s) being managed; some systems allow for deliberation when time is available (Janne Hukkinen, personal communication). That said, one “obvious feature of many . . . settings is that decisions are made under significant time pressure. . . . This time pressure has several obvious but important implications. . . . Decision strategies that demand deliberation—for example, the extensive evaluation of multiple options recommended by many decision theorists—are simply not feasible” (Orasanu and Connolly 1993, 9).

12. This is not to be confused with the work of McDermott (2003) on real time in economics.

13. Can we say something more about better-practice economics? Imagine practitioners come together to create the Professional Society of Real-Time Economics. Its mission would be to document how economic theories are

rendered into local scenarios; what better practices, if any, exist for a given economic activity based on actual micro behavior; and how these practices are modified in light of specific contexts and local protocols, thereby updating practice. The society would also maintain an updated website with reports on these issues and bring professionals together to review, evaluate, and update practices (for example, through meta-analysis of an expanding set of case materials). The society would also have an ethical code listing the ways in which members would be accountable for their advice (see DeMartino 2005, 2011). The society could even award its own prize, where a Warren Buffett would have a better chance of winning than a Robert Shiller.

14. Some financial institutions, most notably Goldman Sachs, accent their real-time networks. Lloyd Blankfein, the chairman of Goldman, made the point this way, in remarks summarized by a respected columnist: “The firm put great emphasis on ensuring that risk concerns were constantly communicated to higher levels of management, ‘getting more fingerprints’ on potential problem risks and challenging the notion that a business group leader ought to make independent decisions on risks that affected the entire firm. There was intense accountability through a host of management committees that evaluated all aspects of risk [at Goldman]” (Plender 2007).

15. In case it needs saying, the financial mess also challenged active investors and funds that, we now know, operated entirely in unstudied conditions (see, for example, El-Erian 2007; Partnoy 2007; see also Croft 2009). “Nobody had imagined a scenario where the money markets froze up like this. It just wasn’t in the stress testing models,” said a policymaker caught up in the credit mess (quoted in Tett 2007c; for the “stress-test mess,” see the *Economist* 2009a).

16. According to the CEO of Citigroup, banking and finance have “gravitated from a hub-and-spoke world, where everything used to go through large financial institutions, to a network of millions of points of contact with each other. . . . You need a network management approach” (quoted in Jenkins, Braithwaite, and Masters 2012).

17. I had the good fortune to work with Hans de Bruijn and others at the Delft University of Technology. Part of my task was to compare two approaches to decisionmaking in dynamic environments. One was a problem-centered approach; the other was a network-centered approach, which de Bruijn and his colleagues have mapped (see, for example, de Bruijn and ten Heuvelhof 2000). What follows in the text is based on a draft of that work, though any errors in summarizing their work are mine.

18. Not only is the policy cycle a mess, but so is every step of the textbook policy analysis process (on the latter, see Bardach 2005). Its first step is to define the problem, but in doing so we vastly overestimate and underestimate the risks associated with important policy and management decisions. Next, assemble the evidence, but here we search out evidence that supports our positions and ignore what does not. Construct the alternatives, but they are often embedded in our initial problem definition rather than constructed

after assembling the evidence. Select the evaluative criteria, but our preferences for and predispositions toward efficiency, equity, and other benchmarks clearly vary across cultures, while attitudes and values are poor guides to what people actually do (see, for example, J. Q. Wilson 1989, 50ff.). Project the outcomes, but human beings are notoriously bad at forecasting the future, let alone predicting what will make them happy (Nisbett 2006; Oswald 2006). Assess the options and choose, but—as has been pointed out countless times—deliberation can make choosing feel like losing (Skapinker 2003). Implement and evaluate, but as Sherman, Crawford, and McConnell (2004, 151) record, we prefer choices where we never learn the outcomes of alternate selections. In this way, the conventionalized “steps in a policy analysis” end up as rather unconventional stations of the cross for the more reflective policy analyst and public manager.

19. Reliability standards were also weakened in the subprime mortgage crisis with respect to industrywide housing appraisal standards.

20. Resilience is taken to have an increasingly important role in regulation. In listing “six principles for a new regulatory order,” Lawrence Summers, in his role as an economist, maintains: “Third, regulation must be premised on the inability of institutions or their regulators to predict future market conditions with much confidence. . . . Rather than judging where and when the next crisis will occur, regulators need to try to assure the resilience of the system with respect to economic shocks or problems in any one sector or institution” (2008).

21. Policymakers assume frequently that an unprecedented event requires an unprecedented response, thereby conflating what is a mess with what is a crisis. The chair of the U.K. Financial Services Authority argues: “When you’ve been through a [financial] crisis like this, it’s rather sensible to wipe the slate clean in terms of your previous assumptions, rather than say: ‘because this has previously been my policy line, I still stick to my policy line’” (quoted in Thal Larsen 2008). This is dangerous thinking if it means pushing those operators managing the financial mess into having to “manage” a terra incognita with no known patterns and scenarios.

22. Ned Gramlich, a former governor of the Federal Reserve, warned early about the dangers of the subprime mortgage “boom and bust,” as he called it (quoted in Andrews 2007). Other Cassandras included Brooksley Born, who was a former head of the Commodity Futures Trading Commission, Paul Volcker, and others in the Bank of International Settlement (for more, see Bezemer 2009; Blackburn 2008, 81–84; Giles 2008).

23. What is not appreciated is how beguiled others in the Federal Reserve, not just Alan Greenspan, were by the allure of these new financial instruments. Roger Ferguson, former vice chair of the Fed, often “presented the official creed of the Washington financial elite—namely that financial innovation was helping to spread risk around the system in a manner that had made the 21st-century banking world more safe, vibrant and efficient than ever

before” (Tett 2009a). Don Kohn, another Fed vice chair, assured us before the meltdown that credit derivative markets “facilitate risk transfer and diversification, thus increasing the resilience of the financial system,” all of which proved to be illusionary (quoted in Guha 2007a). Randall Kroszner, a Fed governor, harmonized: “These developments have greatly enhanced the efficiency and stability of the credit markets and the broader financial system” (quoted in *ibid.*).

24. To take another example, how were derivative exchanges with central clearing able to survive the shocks of the financial turmoil in ways that some over-the-counter credit default swaps did not (see Steil 2008, 11)? “Regulated exchanges have a track record of transparency and reliability that served investors well through many periods of market disruptions,” according to the chief executive of a large exchange (Niederauer 2009).

25. If lags can function as system coolants, we might need to rethink the conventional wisdom that a system is no stronger than its weakest link. Could it be that in some system contexts or periods, a weak link or node acts as a kind of loose coupling, which—when it “fails”—forestalls wider interactivity? Alessandro Vespignani (2009, 428), a network theorist and analyst, reports that taking out a certain number of nodes or links could make the network stronger (in the sense of forestalling a full cascade).

SIX Societal Challenges

1. “Mobile phones became a God-given gift to all Somalia,” said one observer. “If you shut down the mobile phones, everything would stop” (quoted in Akam 2006).

2. Not only did the car become a single resource with multiple services, but so did other units in the supply chain around automobiles. Some vehicle insurers have had their own repair shops, and at least one insurer had its own medical clinic for accidents and injuries (Fleming 2005). Prior to the financial meltdown, Wal-Mart announced it would be opening up to four hundred walk-in health clinics in its stores (Birchall 2007).

3. “The whole credit derivatives world has exploded at such a dizzy pace that nobody is exactly sure where the loan risk has gone” (Tett 2006a; see also Tett 2005). In the absence of knowing where and how credit derivatives were dispersed, scenarios were appealed to—“in essence, the financial system looks increasingly like a giant version of Enron”—and their implications became more and more specific (in our terminology, localized): “It will also require a controversial step that groups such as the New York Federal Reserve and the UK’s Financial Services Authority are inching towards: getting unregulated entities, such as hedge funds, to supply better data to authorities” (Tett 2006a).

4. Some theories of economic growth and technological innovation center on finding new uses for novel recombinations of existing technologies and resources (see, for example, Ellerman 2005, 69; see also Edgerton 2007).

Table 3. Taylor-Russell diagram of Type I and II errors

ACTUAL DECISION		PROPER DECISION	
		<i>Do not shed</i>	<i>Shed</i>
	<i>Do not shed</i>	<u>Correct decision</u> Operations and revenues maintained	<u>Type I error</u> Widespread outage occurs, with economic losses
	<i>Shed</i>	<u>Type II error</u> Unnecessary service disruption and loss of revenue	<u>Correct decision</u> Possibly cascading outage avoided

Source: Adapted from Little 2005

5. Let's assume there is a proper decision to be made with respect to actually shedding or not shedding load. In that case, Type I and II errors are defined with respect to what are incorrect decisions (see table 3 here). Trying to minimize the Type II error cell would mean pulling the dividing lines in the table to the left or down; but the more that is done, the larger the cell for Type I error on the right or above becomes (Little 2005).

6. Jean-Claude Trichet, then president of the European Central Bank, touched on this point when he counseled: "The fragility not only of global finance but of the global economy itself, is something we should reflect on. You know, there are some key intermediate inputs that are produced in only three factories in the world. This is not reliable . . . [and] which in case of a shock might make the full body of the real economy more immediately vulnerable. In the financial system we have eliminated a number of cushions and shock absorbers that we have had here and there" (quoted in Atkins and Barber 2008).

7. "The bottom line is that, given declining assets and increasing liabilities, many—perhaps most—big banks are essentially insolvent and have been for a long time," concluded Frank Partnoy, a professor of finance and law. "It is incredible that they lost so much money on derivatives but even more amazing that they have stayed alive for so long afterwards" (2009, 9). Not so if you believe in mess.

8. For a more general but highly detailed discussion on how cultural theory illuminates the field of public management, rather than just the management of needs and resources, see Hood 2000.

9. When it comes to markets, the social construction can be quite literal.

With reference to pricing credit default swaps, the head of a major financial information service provider stated: “We take data from multiple sources including 40 banks’ books of record, buy-side institutions and interdealer brokers. We then aggregate and clean the data, and in many cases discard up to 60 per cent to publish a comprehensive, high quality dataset” (quoted in van Duyn, Mackenzie, and Tett 2009; see also Whalen 2008 on the lack of definite prices in a number of asset markets).

10. The financiers who profited from the assets they created before the financial mess, assets they could not auction off during the mess without taking a loss, went on to complain that, because the value of the government warrants they received during their bailouts was not determined by the market, the amount they should pay back to the government should reflect that deficiency (Beales and Cyran 2009). The roar you hear is the gods’ laughing. Realism in contrast requires recognizing that in many cases and even in good times quoted market prices are unavailable for most assets, including those listed on exchanges, and that many assets have shallow markets with deep prices characterizing only a small portion (see Whalen 2008).

11. The report of the Group of 30—an organization of international economists and financial policymakers—whose lead author was Paul Volcker, “offered 18 recommendations that would insert government regulators into the boardrooms of financial institutions as never before” (Faiola 2009).

12. Other cultures have organizational formations as well (Flentje 2000; Hood 2000). However, nesting the composite typologies into the others—for example, the egalitarian or individualist—would only reinforce the conclusion drawn here.

13. You can think of the nesting as an increasing refinement of the dimensions of the three typologies. The hierarchist culture is calibrated in terms of how high social constraints and high group cohesion work out as activities in terms of the outputs, outcomes, and their observability. The latter are specified in terms of the options and task environment volatility associated with producing those outcomes and outputs reliably. In brief, four types of organizations, each of which has four types of performance modes, can be said to characterize hierarchist culture.

14. The literature on collaborative networks of professionals managing under time pressures is growing (see, for example, Moynihan 2005; see also de Bruijn and ten Heuvelhof 2000). On craftspeople and trust in these processes, compare the differing treatments but overlapping conclusions in Bardach 1998, Josipovici 1999, and Sennett 2008.

15. According to the sociologist Ronald Burt, changing a network can provide new opportunities for participants who are able to offer third-party assistance to other network members who remain unconnected. Burt calls such resulting gaps between people who could be interconnected, but are not, “structural holes.” Reconfigure a network, and new holes open up among network members: “People on either side of a structural hole circulate in different flows of information. Structural holes are thus an opportunity to

broker the flow of *information* between people, and *control* the projects that bring together people from the opposite sides of the hole” (2001, 35; see also Burt 1992). In this way, the set of options changes.

SEVEN Professional Challenges

1. This distinction and example are suggested by Sass 2003.

2. We must be careful here, as policy may address no-go areas for reasons other than management. Policy can be a form of bearing witness to something that people cannot change or fully comprehend. Such instances are the limiting conditions of mess and reliability management because these are the messes we cannot manage. I give considerable attention elsewhere (Roe 1998) to the role of acknowledging the unmanageable in conventional policy analysis and management.

3. Does the use of “unprecedented” here make me a believer in that other infantilizing analysis stopper: “These are unprecedented times requiring unprecedented solutions”? On the contrary, in our framework “unprecedented” denotes cognitively unstudied conditions in which people have to cope because they cannot manage or problem solve. In other words, the idea that coping mechanisms are “solutions” is risible. However, coping mechanisms in the face of crises, like better management practices in the face of messes we are examining in this book, have evolved over time. So when someone tries to short-circuit analysis by insisting “unprecedented times demand unprecedented action,” the analyst must respond, “That may be true as far as it goes, but it certainly does not go far enough.” Do they really mean to imply that, after more than 50,000 years of the evolution of the human prefrontal cortex and a population of more than 7 billion people across more than 190 countries and habitations so numerous as to defy practical calculation, there remain too few examples of “unprecedented times and responses” from which to learn how to better cope with the latest version of those seriatim “unprecedented problems”?

4. The expression “what is at hand” is crucial in setting the improviser apart from others with different orientations. Thinkers as varied as the essayist Montaigne and the sociologist Alfred Schütz distinguish what is within our reach for the purpose at hand versus what exceeds our grasp. For such thinkers, these distinctions help define one’s self and relation to a world (see, for example, Schütz 1964, 120–34; Shattuck 1996, 29; see also Stanford 2006).

5. For an excellent review of organizational and network examples, see Baker and Nelson 2005; for a broader perspective on organizational bricolage, see Boxenbaum and Rouleau 2011.

6. “More than 70 percent of learning experiences in the workplace are informal or accidental, not structured or sponsored by an employer or a school. . . . This kind of learning is pervasive, continuous, and profoundly social. It happens wherever people do their work” (Thackara 2006, 158).

7. This paragraph owes much to Adam Phillips (2010).

8. George Bernard Shaw, in one of his polemics against the U.S. Constitu-

tion, counseled Americans to farm out running the place to Europeans: “Some years ago I suggested as a remedy that the American cities should be managed from Europe by committees of capable Europeans trained in municipal affairs in London, Berlin, Paris, etc. San Francisco rejected my advice and tried an earthquake instead, not altogether without success as an awakener of public conscience. But earthquakes, though much cheaper and less disastrous than municipal imbecility and corruption, are too uncertain and unpopular to come into regular use” (1907, 862).

9. The Bangladeshi claim against the British Geological Survey was eventually thrown out by the U.K. Appeals Court (Proffitt 2004).

10. Jeffrey Garten, former dean of the Yale School of Management, writes: “The truth is, the [financial] system has become too big and too complex for anyone truly to understand it, let alone know how it would perform in the next major crisis” (2006, 11).

11. My thanks to Ian Mitroff for this point.

12. Dwight D. Eisenhower, “Farewell Radio and Television Address to the American People,” January 17, 1961 (<http://www.presidency.ucsb.edu/ws/index.php?pid=12086&st=&st1=>).

EIGHT How We Know the Policy Mess Is Managed Better

1. Bernanke was not alone in this happy talk. A former Fed chair, Paul Volcker, made similar assurances in a *Wall Street Journal* op-ed, “We Have the Tools to Manage the Crisis” (2008). A Wharton School professor of finance sang from the same hymnal: “We have all the tools necessary to avoid repeating the mistakes. . . . We must not hesitate to use them” (Siegel 2008).

2. Some market inefficiencies are the price we pay for high reliability performance. Economists are right in pointing out that interventions—such as price caps—to ensure, for example, electricity reliability can entail efficiency losses. The deadweight loss resulting from such limits, however, is one measure of how much reliability matters to society.

3. Some financial specialists have also argued that clearinghouse reliability should be treated as a Veblen good: The higher the price of reliability, the more desirable it is to investors (van Duyn 2010a).

4. If operational redesign occurs entails a big “if.” Citigroup, to take a single example from many, refused to concede that it did not make full legal disclosure to weaknesses in internal controls during events leading up to the financial mess. The Sarbanes-Oxley Act required Citigroup to disclose “all significant deficiencies” and “material weaknesses” in such controls. Its regulator informed Citigroup in early 2008 that “several deficiencies . . . need to be addressed,” none of which were disclosed at the time of Citigroup’s certification of prior accounts. In 2011 and in response to the findings of the Financial Crisis Inquiry Commission, Citigroup maintained that those deficiencies actually did not constitute “material weaknesses” (Guerrera 2011).

5. That process of formal recovery has already begun (see Turner's important start, *Economics after the Crisis* [2012]). I thank Paul Schulman for his help in thinking through this material, though I absolve him of my conclusions.

6. In the words of Henry Kaufman, longtime Wall Street economist and financial consultant, a "look back over the past few decades of U.S. history does not show mainstream economics in a good light. It is hard to be optimistic that today's leading economists—whose distinguished careers have defined the status quo—will offer innovative ways of integrating economics and finance. Others must come to the fore. We urgently need economic minds with a broad analytical reach to rise to the occasion" (2010).

7. To my mind, the Hicks-Kaldor compensation principle set great mischief loose upon the political economy. Before Hicks-Kaldor, gainers *would* have to compensate losers; since Hicks-Kaldor, it's okay if the former *could in theory* compensate the latter, even if no real compensation exists.

8. Banks that emerged from the financial mess relatively unscathed understandably saw no need for such a levy, as their financial prudence had already reflected real opportunity costs (see, for example, P. Smith 2010).

9. The lack of market infrastructure for the novel securitized financial instruments was telling. Citigroup for instance was criticized by the Financial Crisis Inquiry Commission for "lack of proper infrastructure and internal control" with respect to its collateralized derivative obligations (2011, 303).

10. The last public lecture of Herbert Simon, the Nobel laureate, linked issues of productivity to what this book calls the reliability of infrastructure and its management: "Let me pose a simple question. Consider the income that you or your family now earn as members of American society (which most of you are) and compare it with the income that you would expect to earn if you were equally hardworking members of Chinese or Indian society, or the society of any other Third World nation. I expect that for most of you, the difference between the two incomes is one or more orders of magnitude, at least 10 to 1 and perhaps even more than 100 to 1.

"Now, I would like you to consider the causes for the gap between the 10 and the 1 or the 100 and the 1. How much of it do you wish to attribute to your superior energy, motivation, and application of effort as compared with your Third World counterparts? And how much do you wish to attribute to your good luck or good judgement [*sic*] in being born in, or joining, the highly productive and democratic American society?

"If we are very generous with ourselves, I suppose we might claim that we 'earned' as much as one fifth of it. The rest is patrimony associated with being a member of an enormously productive social system, which has accumulated a vast store of physical capital, and an even larger store of intellectual capital—including knowledge, skills, and organizational know-how held by all of us—so that interaction with our equally talented fellow citizens rubs off on us both much of this knowledge and this generous allotment of unearned income" (accessed online on December 20, 2011 at <http://research.mbs.ac.uk/hsi/Aboutus/HerbertSimonsLastPublicLecture.aspx>).

BIBLIOGRAPHY

- Abrahamson, E., and D. Freedman. 2006. *A Perfect Mess: The Hidden Benefits of Disorder—How Crammed Closets, Cluttered Offices, and On-the-Fly Planning Make the World a Better Place*. New York: Little, Brown.
- Ackermann, J. 2008. "How the banks can win back confidence." *Financial Times*, July 31.
- Ackoff, R. L. 1999. *Ackoff's Best: His Classic Writings on Management*. New York: John Wiley and Sons.
- Ackoff, R. L., and S. Rovin. 2003. *Redesigning Society*. Stanford: Stanford University Press.
- Adams, J. 2010. "Exploring links to improve health care." Review of *Social Networks and Health*, by T. W. Valente. *Science* 330 (December 17): 1628–29.
- Adger, W. N., et al. 2005. "Social-ecological resilience to coastal disasters." *Science* 309 (August 12): 1036–39.
- "Afro-America at the start of a new century." 2002. *Salmagundi*, Winter–Spring, 81–238.
- Aidt, T., and Z. Tzannatos. 2002. *Unions and Collective Bargaining, Economic Effects in a Global Environment*. Washington: World Bank.
- . 2008. "Trade unions, collective bargaining and macroeconomic performance: A review." *Industrial Relations Journal* 39 (4): 258–295.
- Akam, S. 2006. "Mobile success emerges amid the mayhem." *Financial Times*, October 4.
- Alloway, T. 2012. "Defect in key management tool." *Financial Times*, May 14.
- Altman, R., and R. Haass. 2010. "American profligacy and American power." *Foreign Affairs* 89 (6): 25–34.
- Anand, S. 2009. "Treasury pads coffers in bailout." *Wall Street Journal*, February 17.
- Anderson, J. 2007. "Calm before and during the storm: Derivatives may put the New York Fed chief through a stress test." *New York Times*, February 9.
- Andrews, E. 2007. "Fed and regulators shrugged as the subprime crisis spread." *New York Times*, December 18.
- Ascherson, N. 2001. "Reflections on international space." *London Review of Books*, May 24, 7–11.
- Atkins, R., and L. Barber. 2008. "Jean-Claude Trichet interview transcript." *Financial Times*, December 15.
- Auerswald, P., et al. 2005. "The challenge of protecting critical infrastructure." *Issues in Science and Technology* 22 (1): 77–83.
- Authers, J. 2007. "Quants must work on their shortcomings." *Financial Times*, August 21.

- . 2009a. "Managers seek a more reliable approach." *Financial Times*, October 2.
- . 2009b. "Wanted: New model for markets." *Financial Times*, September 29.
- Bair, S. 2009. "The boss: That dollar in the passbook." *New York Times*, July 26.
- Bajaj, V. 2008. "Rescue plan's basic mystery: What's all this stuff worth?" *New York Times*, September 25.
- Baker, T., and R. Nelson. 2005. "Creating something from nothing: Resource construction through entrepreneurial bricolage." *Administrative Science Quarterly* 50 (3): 329–66.
- Banziger, H. 2012. "Banks must change their business models to regain trust." *Financial Times*, May 22.
- Barber, B. 2002. "Comments made during a special conference on Afro-America at the start of a new century." *Salmagundi*, Winter–Spring.
- Bardach, E. 1998. *Getting Agencies to Work Together: The Practice and Theory of Managerial Craftsmanship*. Washington: Brookings Institution.
- . 2005. *A Practical Guide for Policy Analysis*. 2nd ed. Washington: CQ Press.
- Basel Committee on Banking Supervision. 2008. *Consultative Document: Guidelines for Computing Capital for Incremental Risk in the Trading Book*. Basel, Switzerland: Bank for International Settlements.
- Beales, R., and R. Cyran. 2009. "After the bailout, the haggling." *New York Times*, November 23.
- Beattie, A. 2009. "Regulators urged to loosen credit restrictions on banks." *Financial Times*, October 15.
- Beck, U. 1999. *World Risk Society*. Cambridge: Polity.
- Becker, G. 2005. "The nuclear option." *Wall Street Journal*, May 12.
- Beer, G. 1983. "George Eliot: *Daniel Deronda* and the idea of a future life." In G. Beer, *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*, 181–209. London: Routledge and Kegan Paul.
- Begley, S. 2004. "Despite its reputation, fingerprint evidence isn't really infallible." *Wall Street Journal*, June 4.
- . 2005a. "Fingerprint matches come under more fire as potentially fallible." *Wall Street Journal*, October 7.
- . 2005b. "Our brains strive to see only the good, leading some to God." *Wall Street Journal*, October 28.
- Bendavid, N. 2008. "Democrats offer a reality check." *Wall Street Journal*, December 22.
- Berger, J. 2003. *Selected Essays: John Berger*. Edited by G. Dyer. New York: Vintage International.
- Bernasek, A. 2003. "The \$44 trillion abyss." *Fortune*, November 24 (accessed online on August 2, 2012, at http://money.cnn.com/magazines/fortune/fortune_archive/2003/11/24/353758/index.htm).
- Besharov, D. 2007. "Beyond the safety net." *Focus* 25 (1): 45–51.

- Betts, P. 2008. "Europe's blameless banks fall off their pedestals." *Financial Times*, December 18.
- Bezemer, D. 2009. "Why some economists could see it coming." *Financial Times*, September 8.
- Bhagwati, J. 2002. "The poor's best hope." *Economist*, June 22, 24–25.
- . 2005. "A chance to lift the 'aid curse.'" *Wall Street Journal*, March 22.
- . 2008. "We need to guard against destructive creation." *Financial Times*, October 17.
- Birchall, J. 2007. "Wal-Mart to put 400 health clinics in stores." *Financial Times*, April 25.
- Blackburn, R. 2008. "The subprime crisis." *New Left Review* 50 (March–April): 63–106.
- Blankfein, L. 2009. "Do not destroy the essential catalyst of risk." *Financial Times*, February 9.
- Blinder, A. 2007. "Six fingers of blame in the mortgage mess." *New York Times*, September 30.
- . 2009. "Nationalize? Hey, not so fast." *New York Times*, March 8.
- Bloom, D. 2011. "7 billion and counting." *Science* 33 (July 29): 562–69.
- Boeri, T., A. Brugiavini, and L. Calmfors, eds. 2001. *The Role of Unions in the Twenty-First Century: A Study for the Fondazione Rodolfo De Benedetti*. Oxford: Oxford University Press.
- Boin, A., et al. 2005. *The Politics of Crisis Management: Public Leadership under Pressure*. Cambridge: Cambridge University Press.
- Bowe, C. 2005. "Risk assessment: Changing attitudes to safety challenge the drugs industry." *Financial Times*, August 1.
- Bowley, G. 2011. "'Flash crash' panel lays out several steps to diminish volatility in the market." *New York Times*, February 19.
- Boxenbaum, E., and L. Rouleau. 2011. "New knowledge products as bricolage: Metaphors and scripts in organization theory." *Academy of Management Review* 36 (2): 272–96.
- Boyarchenko, S., and S. Levendorskii. 2009. "Size and growth of the next big thing must be restricted." Letter to the editor. *Financial Times*, March 5.
- Boyde, E. 2011. "Trees promise solid long-term growth." *Financial Times* (FTfm supplement), June 6.
- Braithwaite, T. 2010. "Deposits regulator points finger at Fed." *Financial Times*, January 15.
- Brander, J. 2002. "Review of *The Skeptical Environmentalist*." *Journal of Economic Literature* 40 (September): 972–74.
- Brittan, S. 2008. "Conditions for a rebalanced economy." *Financial Times*, August 1.
- Brown, K. 2002. "Water scarcity: Forecasting the future with spotty data." *Science* 297 (August 9): 926–27.
- Bullock, N. 2011. "States guilty of forecast errors." *Financial Times*, March 2.
- Bullock, N., T. Demos, and S. Nasiripour. 2012. "Bull run in 'toxic' subprime debt divides investors." *Financial Times*, February 14.

- Burt, R. S. 1992. *Structural Holes: The Social Structure of Competition*. Cambridge: Harvard University Press.
- . 2001. "Structure holes versus network closure as social capital." In *Social Capital: Theory and Research*, edited by N. Lin, K. Cook, and R. S. Burt, 31–56. New Brunswick, N.J.: Aldine Transaction.
- Caldwell, C. 2008a. "The excesses of pragmatism." *Financial Times*, October 11–12.
- . 2008b. "Time for some morality trades." *Financial Times*, December 20–21.
- Calomiris, C., and P. Wallison. 2008. "Blame Fannie Mae and Congress for the credit mess." *Wall Street Journal*, September 23.
- Carlson, M., T. King, and K. Lewis. 2011. "Distress in the financial sector and economic activity." *B. E. Journal of Economic Analysis & Policy* 11 (1) (<http://www.bepress.com/bejeap/vol11/iss1/art35>).
- Carr, E. 2009. "Greed—and fear." In *The Future of Finance*, special report in the *Economist*, January 24, 1–24.
- Chamie, J. 2010. "Decoding demography." Letter to the editor. *Foreign Affairs* 89 (3): 157–58.
- Chan, S., and J. C. McGinty. 2010. "In crisis, Fed opened vault wide for U.S. and world, data shows." *New York Times*, December 2.
- Cherp, A., I. Kopteva, and R. Mnatsakanian. 2003. "Economic transition and environmental sustainability: Effects of economic restructuring on air pollution in the Russian Federation." *Journal of Environmental Management* 68: 141–51.
- Chung, J. 2009. "Regulators in drive to curb bribery." *Financial Times*, July 27.
- Cifuentes, A. 2008. "PR crisis is taking heavy toll on credit derivatives." *Financial Times*, November 11.
- Clark, J. A., and R. M. May. 2002. "Taxonomic bias in conservation research." *Science* 297 (July 12): 191–92.
- Clark, T. J. 2012. "For a left with no future." *New Left Review* 74 (March–April): 53–75.
- Coggan, P. 2004. "Of cauliflowers and clusters." *Financial Times*, July 3–4.
- Cohan, W. 2009. "A tsunami of excuses." *New York Times*, March 12.
- Collingridge, D. 1992. *The Management of Scale: Big Organizations, Big Decisions, Big Mistakes*. London: Routledge.
- Commodity Futures Trading Commission [CFTC] and the Securities and Exchange Commission [SEC]. 2010a. *Findings Regarding the Market Events of May 6, 2010: Report of the Staffs of the CFTC and SEC to the Joint Advisory Committee on Emerging Regulatory Issues*. Washington.
- . 2010b. *Recommendations Regarding Regulatory Responses to the Market Events of May 6, 2010: Summary Report of the Joint CFTC-SEC Advisory Committee on Emerging Regulatory Issues*. Washington.
- Cooper, M., and M. Walsh. 2010. "Mounting debts by states stoke fears of crisis." *New York Times*, December 5.

- Cooper, R. N., and R. Layard. 2002. Introduction to *What the Future Holds: Insights from Social Science*, edited by R. N. Cooper and R. Layard, 1–15. Cambridge: MIT Press.
- Copenhagen Consensus. n.d. Chronological Overview of Key Copenhagen Consensus Center Research Papers (<http://www.copenhagenconsensus.com/About%20the%20Center/Bibliography.aspx>).
- Corrigan, G. 2008. "Top priorities to address key points of stress in the markets." *Financial Times*, October 1.
- . 2010. "View from the top: Gerald Corrigan." *Financial Times*, October 18.
- Croft, J. 2009. "Modelling adapts as catastrophic clouds clear." *Financial Times*, October 5.
- Crook, C. 2010. "We were all to blame for the crash." *Financial Times*, June 21.
- Crooks, E. 2008. "Energy security will be hit by global slowdown." *Financial Times*, November 24.
- Crossette, B. 2002. "Experts scaling back their estimates of world population growth." *New York Times*, August 20.
- Cyran, R. 2009. "Canadian banks missed a chance." *New York Times*, September 28.
- Das, S. 2007. "Q&A: Quantitative investing." *Financial Times*, August 27.
- . 2011. "'Botox' economics triggers toxic eurozone side-effects." *Financial Times*, August 11.
- Dasgupta, P. 2005. "Bottlenecks." *London Review of Books*, May 19, 21–22.
- Daugherty, C., and F. Allendorf. 2002. "The numbers that really matter." *Conservation Biology* 16 (2): 283–84.
- David, G. 2004. "Sit! Stay! Testify!" *Fortune*, January 26.
- Davies, H. 2009. "We need to rationalise the rules on capital." *Financial Times*, September 24.
- . 2011. "Europe needs a plan to fortify the banks." *Financial Times*, July 18.
- Davies, P. 2008. "Real reason to regulate derivatives is liquidity." *Financial Times*, October 3.
- . 2009. "Systemic risks of insurers in spotlight." *Financial Times*, December 4.
- Davies, P., and S.-M. Ishmael. 2008. "CDOs 'to tumble 60%' in 2008." *Financial Times*, January 8.
- Davies, P., G. Tett, and S. Scholtes. 2006. "Derivatives dealers' tough match." *Financial Times*, September 25.
- Davies, P., et al. 2009. "Tier one bonds tumble in value." *Financial Times*, January 24–25.
- Davis, P. 2008. "Infrastructure takes a knock in downturn." *Financial Times*, November 24.
- De Bruijn, H., and E. ten Heuvelhof. 2000. *Networks and Decision Making*. Utrecht, The Netherlands: Lemma.
- De Bruijne, M., and M. van Eeten. 2007. "Systems that should have failed:

- Critical infrastructure protection in an institutionally fragmented environment." *Journal of Contingencies and Crisis Management* 15 (1): 18–29.
- De Quincey, T. 1849. *The Logic of Political Economy and Other Papers*. Boston: Ticknor and Fields (accessed online on July 22, 2012, at <http://quod.lib.umich.edu>).
- De Soto, H. 2012. "Knowledge lies at the heart of western capitalism." *Financial Times*, January 30.
- De Waal, T. 2008. "Bottleneck at the Bosphorus." *Financial Times*, January 5–6.
- Dear, J. 2011. "Slow pace of crisis reforms keeps me awake at night." *Financial Times*, June 2.
- DeMartino, G. 2005. "A professional ethics code for economists." *Challenge* 48 (4): 88–104.
- . 2011. *The Economist's Oath: On the Need for and Content of Professional Economic Ethics*. New York: Oxford University Press.
- Demos, T. 2012. "Traders still waiting for measures to prevent a repeat of 2010's 'flash crash.'" *Financial Times*, May 7.
- Despeignes, P. 2003. "Report warns of chronic US deficits." *Financial Times*, May 29.
- Diamond, J. 2005. *Collapse: How Societies Choose to Fail or Succeed*. New York: Viking.
- Dickinson, Lt. Col. R. J., comp. 1973. *Officers' Mess: Being a History of Mess Origins and Customs from a Wealth of Military Records, Enlivened Anecdotes of Mess Times Remembered from a Host of One-Time Mess Members; and the Progress of Charles Oswald Littlewart from 2/Lieutenant to Major-General*. Tunbridge Wells, U.K.: Midas.
- Dijksterhuis, A., et al. 2006. "On making the right choice: The deliberation-without-attention effect." *Science* 311 (February 17): 1005–7.
- Dillon, S. 2005. "Report faults Bush initiative on education." *New York Times*, February 24.
- Dizard, J. 2008. "Democratise the credit markets for fast relief." *Financial Times*, December 22.
- Dombey, D., and D. Sevastopulo. 2009. "Clinton signals a smart retreat from democratization." *Financial Times*, February 6.
- Dombret, A., and P. Tucker. 2012. "A blueprint for finishing the job on financial regulation." *Financial Times*, May 21.
- Dos Anjos, M., Jr., and V. Chick. 1995. "Liquidity and potential surprise." In *Economics as an Art of Thought: Essays in Memory of G. L. S. Shackle*, edited by P. Earl and S. Frowen, 242–68. London: Taylor and Francis.
- Drummond, H. 2001. *The Art of Decision Making: Mirrors of Imagination, Masks of Fate*. Chichester, UK: John Wiley and Sons.
- Dudley, W. 2012. "How we will stop derivatives magnifying future crises." *Financial Times*, April 16.
- Duffie, D., and H. Hu. 2008. "Derivatives are (not just) a tale of two cities." *Financial Times*, May 1.

- Eadie, B. 2010. "Finance industry must use appropriate description of risk." Letter to the editor. *Financial Times*, August 10.
- Easterly, W. 2005. "Big plans to halt poverty don't work." *International Herald Tribune*, July 4.
- Eavis, P., and S. Craig. 2012. "Risk management failed at JPMorgan, as it has so often for others." *New York Times*, May 12.
- Economist*. 2005. "Mobile phones and development: Less is more." July 7, 11.
- . 2006. "Big questions and big numbers." In *Economic Models*, special report, July 15, 67–69.
- . 2009a. "Stress-test mess." February 26, 75.
- . 2009b. "When a flow becomes a flood." January 22, 70–72.
- Edelman, G. 2007. "Learning in and from brain-based devices." *Science* 318 (November 16): 1103–5.
- Edgerton, D. 2007. *The Shock of the Old: Technology and Global History since 1900*. New York: Oxford University Press.
- Efrati, A. 2009. "Foreclosure challenges raise questions about judicial role." *Wall Street Journal*, December 24.
- Ehrlich, P., and S. Levin. 2005. "The evolution of norms." *PloS Biology* 3 (6): 943–48.
- Eisinger, J. 2012. "In JPMorgan scrutiny, crucial questions left unasked." *New York Times*, May 17.
- El-Erian, M. 2007. "How to reduce risk in the financial system." *Financial Times*, July 10.
- Ellerman, D. 2005. "How do we grow? Jane Jacobs on diversification and specialization." *Challenge* 48 (3): 50–83.
- Enzensberger, H. M. 1992. *Mediocrity and Delusion: Collected Diversions*. Translated by Martin Chalmers. London: Verso.
- Faerman, S., D. McCaffrey, and D. Van Slyke. 2001. "Understanding interorganizational cooperation: Public-private collaboration in regulating financial market innovation." *Organization Science* 12 (3): 372–88.
- Faiola, A. 2009. "Obama adviser urges more rigorous global financial regulation." *Washington Post*, January 16.
- Falkner, R. 2007. "The global biotech food fight: Why the United States got it so wrong." *Brown Journal of World Affairs* 14 (1): 99–110.
- Fatovic, C. 2009. *Outside the Law: Emergency and Executive Power*. Baltimore: Johns Hopkins University Press.
- The Federal Response to Hurricane Katrina: Lessons Learned*. 2006. Washington: White House (<http://georgewbush-whitehouse.archives.gov/reports/katrina-lessons-learned/>).
- Feldstein, M. 2008. "The problem is still falling house prices." *Wall Street Journal*, October 4–5.
- Felsted, A., and F. Guerrero. 2008. "Inadequate cover." *Financial Times*, October 7.
- Ferguson, A. 1792. *Principles of Moral and Political Science* (<http://books.google.com>).

- Ferguson, N., and L. Kotlikoff. 2009. "How to take moral hazard out of banking." *Financial Times*, December 3.
- Financial Crisis Inquiry Commission [FCIC]. 2011. *The Financial Crisis Inquiry Report: Final Report of the National Commission on the Causes of the Financial and Economic Crisis in the United States*. New York: Public Affairs Reports.
- Financial Times*. 2008. "Bail-out talks regain momentum." *Financial Times*, September 27–28.
- . 2009. "Gillian Tett in 'Debating the Downturn.' Roundtable Discussion in the FT Guide to Davos." *Financial Times*, January 27.
- Fisher, J. 2008. *Forensics under Fire: Are Bad Science and Dueling Experts Corrupting Criminal Justice?* New Brunswick, N.J.: Rutgers University Press.
- Fisher, J., and D. Johnson. 2006. "Consumption mobility in the United States: Evidence from two panel data sets." *B. E. Journal of Economic Analysis & Policy* 6 (1) (<http://www.bepress.com/bejeap/topics/vol6/iss1/art16/>).
- Flaherty, J. 2008. "'Boring' Canada's financial tips for the world." *Financial Times*, November 13.
- Fleming, C. 2005. "Car insurer has medical clinic to cut costs." *Wall Street Journal*, December 28.
- Flentje, H. E. 2000. "State administration in cultural context." In *Handbook of State Government Administration*, edited by J. J. Gargan, 67–105. New York: Marcel Dekker.
- Flyvbjerg, B., N. Bruzelius, and W. Rothengatter. 2003. *Megaprojects and Risk: An Anatomy of Ambition*. Cambridge: Cambridge University Press.
- Fountain, H. 2009. "Plugging holes in the science." *New York Times*, May 12.
- Freeland, C., and T. Demos. 2010. "View from the top: Jeffrey Aronson." *Financial Times*, March 1.
- Freeland, R. 2002. "When organizational messiness works." *Harvard Business Review* 80 (5): 24–25.
- Friedman, B. 2009. "The failure of the economy & the economists." *New York Review of Books*, May 28, 42–45.
- Friedman, J. 2009. "A crisis of politics, not economics: Complexity, ignorance, and policy failure." *Critical Review* 21 (2–3): 127–83.
- Gangahar, A. 2006. "Ask before you dive in and buy." *Financial Times*, November 18–19.
- Gapper, J. 2009. "Irrational outrage." *Financial Times*, June 11.
- Garbis, C., and H. Artman. 2004. "Team situational awareness as communication practice." In *A Cognitive Approach to Situation Awareness: Theory and Application*, edited by S. Banbury and S. Tremblay, 275–94. Aldershot, UK: Ashgate.
- Gardels, N. 2006. "He has seen the future." *Financial Times*, August 19–20.
- Garten, J. 2006. "Markets' resilience to terror is no reason to relax." *Financial Times*, September 11.
- Gay, P. 1966. *The Enlightenment: An Interpretation*. Vol. 1, *The Rise of Modern Paganism*. New York: W. W. Norton.

- Geithner, T. 2009. "Stability depends on more capital." *Financial Times*, September 4.
- Geithner, T., C. McCarthy, and A. Nazareth. 2006. "A safer strategy for the credit products explosion." *Financial Times*, September 28.
- Geuss, R. 2008. *Philosophy and Real Politics*. Princeton: Princeton University Press.
- Gigerenzer, G. 2007. *Gut Feelings: The Intelligence of the Unconscious*. New York: Viking Penguin.
- Gilbert, D. 2006. *Stumbling on Happiness*. New York: Alfred A. Knopf.
- Gilbert, D., and T. Wilson. 2007. "Prospection: Experiencing the future." *Science* 317 (September 7): 1351–54.
- Giles, C. 2008. "The vision thing." *Financial Times*, November 26.
- Gillis, J., and C. Dugger. 2011. "U.N. sees rise for the world to 10.1 billion." *New York Times*, May 4.
- Gladwell, M. 2005. *Blink: The Power of Thinking without Thinking*. New York: Little, Brown.
- Glazer, N. 2003. "On Americans & inequality." *Daedalus*, Summer, 111–15.
- Godfray, H. C., et al. 2010. "Food security: The challenge of feeding 9 billion people." *Science* 327 (February 12): 812–18.
- Goldie, P. 2012. *The Mess Inside: Narrative, Emotion and the Mind*. Oxford: Oxford University Press.
- Goldstein, M. 2008. "A proposal to improve the banks' regulatory liquidity." *Financial Times*, May 22.
- Goodhart, C., and A. Persaud. 2008. "A party pooper's guide to financial stability." *Financial Times*, June 5.
- Gordon, M. 2008. "Occupation plan for Iraq faulted in Army history." *New York Times*, June 29.
- Grant, J. 2008. "DTCC clears Lehman hurdle." *Financial Times*, October 31.
- . 2009a. "Caution over OTC clearing as dealers flex their muscles." *Financial Times*, November 13.
- . 2009b. "Clearing not the cure-all for financial system woes." *Financial Times*, June 26.
- . 2009c. "Exchanges issue warning on spread of 'dark pools.'" *Financial Times*, September 23.
- . 2009d. "LCH.Clearnet sees need for clear path to Washington." *Financial Times*, November 27.
- . 2010. "Concerns mount over clearing reforms." *Financial Times*, September 30.
- . 2011a. "Conduits of contention." *Financial Times*, June 16.
- . 2011b. "Review of *The Risk Controllers*." In *Exchanges, Trading and Clearing*, special report, *Financial Times*, October 10.
- Grant, J., and J. Hughes 2008. "Lehman clean-up passes clearing milestone." *Financial Times*, September 24.
- Grant, J., R. Milne, and A. van Duyn. 2009. "Collateral damage." *Financial Times*, October 7.

- Greenhalgh, H. 2010. "Endless city." In *The Future of Cities*, Part I, special supplement, *Financial Times*, April 7.
- Greifeld, B. 2009. "Exchanges should unite to end flash orders." *Financial Times*, August 7.
- Grigsby, J., and D. Stevens. 2000. *Neurodynamics of Personality*. New York: Guilford.
- Groopman, J. 2007. *How Doctors Think*. Boston: Houghton Mifflin.
- . 2010. "Health care: Who knows 'best'?" *New York Review of Books*, February 11, 12–15.
- Guerrera, F. 2011. "Citi under fire over disclosure." *Financial Times*, March 1.
- Guerrera, F., and N. Bullock. 2008. "Struggle to unearth quake's epicentre." *Financial Times*, October 31.
- Guerrera, F., and J. Politi. 2010. "Citi took outside advice on securities." *Financial Times*, April 8.
- Guha, K. 2007a. "Credit derivatives growth boosts US, say Fed governors." *Financial Times*, March 23.
- . 2007b. "Fed unveils revamp of mortgage rules." *Financial Times*, December 19.
- . 2008a. "Greenspan urges policymakers to focus on banks' capitalization." *Financial Times*, May 27.
- . 2008b. "US lacked the tools to tackle crisis, says Paulson." *Financial Times*, December 31.
- . 2009a. "Imbalances imply a trouble well beyond risky banking." *Financial Times*, March 10.
- . 2009b. "Towards the next peak." *Financial Times*, August 26.
- Guha, K., and A. van Duyn. 2008. "Fed chief warns not to expect rapid recovery." *Financial Times*, October 16.
- Guha, K., et al. 2008. "Rally defies deepening crisis." *Financial Times*, October 1.
- Hamill, S. 2008. "Pathologist accused of profiting from office." *New York Times*, January 28.
- Hamilton, A. 1965. *The Papers of Alexander Hamilton*. Edited by H. C. Syrett. Vol. 8. New York: Columbia University Press.
- Hansen J., et al. 2008. "Target atmospheric CO₂: Where should humanity aim?" *Open Atmospheric Science Journal* 2: 217–31.
- Harding, J. 2006. "Short cuts." *London Review of Books*, September 7, 20.
- Harrison, M., and A. Shirom. 1999. *Organizational Diagnosis and Assessment: Bridging Theory and Practice*. Thousand Oaks, Calif.: Sage.
- Harvard Business Review*. 2003. "It's messier than you think." 81 (4): 96.
- Harvey, F. 2008. "Environmental benefits are not always so great." *Financial Times*, April 25.
- . 2009a. "Antarctic shielded by ozone hole, say scientists." *Financial Times*, December 1.
- . 2009b. "World recession results in steep fall in greenhouse gas emissions." *Financial Times*, September 21.
- Hausmann, R., and F. Sturzenegger. 2005. "'Dark matter' makes the US deficit disappear." *Financial Times*, December 8.

- Hayek, F. A. von. 1945. "The use of knowledge in society." *American Economic Review* 35 (4): 519–30.
- . 1974. "The pretence of knowledge." Lecture to the memory of Alfred Nobel, December 11 (http://www.nobelprize.org/nobel_prizes/economics/laureates/1974/hayek-lecture.html).
- Heal, G. 2003. "US is not connecting with the full implications of the interdependence of its power providers." Letter to the editor. *Financial Times*, August 26.
- Heller, M. 2002. "Life-cycle infrastructure risk management: R&D needs." Paper prepared for the Columbia-Wharton/Penn Roundtable on "Risk Management Strategies in an Uncertain World," April 12–13, 2002, Palisades, New York (http://www.ldeo.columbia.edu/chrr/documents/meetings/roundtable/pdf/notes/heller_miriam_note.pdf). Quotations and figure used with permission.
- Hill, A., and J. Leahy. 2009. "FSA bids farewell to light-touch financial regulation." *Financial Times*, March 19.
- Hill, M., and P. Hupe. 2002. *Implementing Public Policy: Governance in Theory and in Practice*. London: Sage.
- Hillman, D., and A. Phillips. 2007. Introduction to *The Book of Interruptions*, edited by D. Hillman and A. Phillips. Bern, Switzerland: Peter Lang: 7–15.
- Hirschman, A. O. 1970. "The search for paradigms as a hindrance to understanding." *World Politics* 22 (3): 329–43.
- Holzer, H., and P. Offner. 2004. "The puzzle of black male unemployment." *Public Interest*, Winter, 74–84.
- Honigsmann, D. 2004. "The big bad wolf." Review of *Fear: The History of a Political Idea*, by Corey Robin. *Financial Times*, December 18–19.
- Hood, C. 2000. *The Art of the State: Culture, Rhetoric, and Public Management*. Oxford: Oxford University Press.
- Houlder, V. 2009. "Scale of bank losses may offer fresh opportunities." *Financial Times*, July 30.
- Hubbard, G., H. Scott, and J. Thornton. 2009. "The Fed's independence is at risk." *Financial Times*, August 21.
- Hughes, J. 2008a. "Bernanke is right to resist calls to soften fair-value rules." *Financial Times*, September 25.
- . 2008b. "Fair value accounting rules eased." *Financial Times*, October 14.
- . 2008c. "Fair value can flatter to deceive on your own debt." *Financial Times*, July 24.
- . 2009. "Putting a price on toxic assets could cost public finances." *Financial Times*, March 26.
- . 2010. "Spotlight on use of government bond yields as risk-free rate." *Financial Times*, March 10.
- Issing, O., et al. 2005. *Imperfect Knowledge and Monetary Policy*. Cambridge: Cambridge University Press.
- Jackson, T. 2008. "Is nationalization the answer to banks behaving badly?" *Financial Times*, October 13.

- Jenkins, P. 2009. "Goldman chief says bank lost control." *Financial Times*, September 10.
- Jenkins, P., T. Braithwaite, and B. Masters. 2012. "New force emerges from the shadows." *Financial Times*, April 10.
- Jenkins, P., and M. Johnson. 2012. "Spain calls in valuers over real estate loans." *Financial Times*, May 17.
- Johansson, P., et al. 2005. "Failure to detect mismatches between intention and outcome in a simple decision task." *Science* 310 (October 7): 116–19.
- Johnson, D. G. 2002. "The virtues of inequality." *Daedalus*, Spring, 146–47.
- Jolly, D. 2012. "Profit at big French bank doubles to hit \$1.7 billion." *New York Times*, November 8.
- Jones, A. 2012. "How to treat treasures." *Financial Times*, March 9.
- Josipovici, G. 1999. *On Trust: Art and the Temptations of Suspicion*. New Haven: Yale University Press.
- Kaiser, J. 2002. "Satellites spy more forest than expected." *Science* 297 (August 9): 919.
- Kaplan, R. 2011. "Academics need to get 'down and dirty.'" *Financial Times*, June 6.
- Kaplan, R., R. Merton, and S. Richard. 2009. "Disclose the fair value of complex securities." *Financial Times*, August 18.
- Karabegovic, A., et al. 2004. *Measuring Labour Markets in Canada and the United States*. Fraser Institute Digital Publication. Vancouver British Columbia, Canada: The Fraser Institute.
- Kaufman, H. 2010. "Prepare for change on Wall Street." *Financial Times*, June 2.
- Kay, J. 2008. "Could Napoleon have coped in a credit crunch?" *Financial Times*, October 29.
- . 2009a. "'Too big to fail' is too dumb to keep." *Financial Times*, October 28.
- . 2009b. "Too big to fail: Wall Street, we have a problem." *Financial Times*, July 22.
- . 2009c. "Why 'too big to fail' is too much for us to take." *Financial Times*, May 27.
- . 2010. "Bonds designed to leave savers bemused." *Financial Times*, November 17.
- . 2011. "Why economists still stubbornly stick to their guns." *Financial Times*, April 16–17.
- Kearney, A. 2002. "Globalization's last hurrah?" *Foreign Policy* (January–February): 38–51.
- Kennedy, D. 2003. "Forensic science: Oxymoron?" *Science* 302 (December 5): 1625.
- Kennel, C. 2009. "Climate change: Think globally, assess regionally, act locally." *Issues in Science and Technology*, Winter, 47–52.
- Kerr, R. 2004. "Storm in-a-box forecasting." *Science* 304 (May 14): 946–48.

- King, D. 2007. "U.K. science advisor offers some parting shots." Interview by Daniel Clery. *Science* 318 (December 21): 1862–63.
- Kingdon, J. W. 1995. *Agendas, Alternatives and Public Policies*. 2nd ed. New York: HarperCollins.
- Kingson, J. 2006. "The convenience of an ATM, but so much more." *New York Times*, April 1.
- Klein, B., and K. Cukier. 2009. "Tamed tigers, distressed dragon: How export-led growth derailed Asian economies." *Foreign Affairs* 88 (4): 8–16.
- Klein, G. 1998. *Sources of Power: How People Make Decisions*. Cambridge: MIT Press.
- . 2003. *Intuition at Work*. New York: Currency/Doubleday.
- . 2009. *Streetlights and Shadows: Searching for the Keys to Adaptive Decision Making*. Cambridge: MIT Press.
- Knorr Cetina, K., and U. Bruegger. 2002. "Global microstructures: The virtual societies of financial markets." *American Journal of Sociology* 107 (4): 905–50.
- Koechlin, E., and A. Hyafil. 2007. "Anterior prefrontal function and the limits of human decision-making." *Science* 318 (October 26): 594–98.
- Körding, K. 2007. "Decision theory: What 'should' the nervous system do?" *Science* 318 (October 26): 606–10.
- Kraft, M., and S. Furlong. 2004. *Public Policy: Politics, Analysis, and Alternatives*. Washington: CQ Press.
- Krugman, P. 2008a. "Success breeds failure." *New York Times*, May 5.
- . 2008b. "What to do." *New York Review of Books*, December 18, 8–10.
- Kunstler, J. 2005. *The Long Emergency: Surviving the Converging Catastrophes of the 21st Century*. New York: Atlantic Monthly.
- Labaton, S. 2009. "Bill would shift rescue of banks." *New York Times*, October 28.
- LaPorte, T. R., ed. 1975. *Organized Social Complexity: Challenge to Politics and Policy*. Princeton: Princeton University Press.
- . 1996. "High reliability organizations: Unlikely, demanding and at risk." *Journal of Contingencies and Crisis Management* 4 (2): 60–71.
- Law, J. 2004. *After Method: Mess in Social Science Research*. London: Routledge.
- Lay, K. L. 1970. "The Measurement of the Timing of the Economic Impact of Defense Procurement Activity: An Analysis of the Vietnam Buildup." PhD diss., University of Houston.
- Lee, A. 2009. "International watchdog is needed to restore trust." *Financial Times*, December 16.
- Lee, R. 2011. "The outlook for population growth." *Science* 333 (July 29): 569–73.
- Leigh, R. 2006. "Amazing mace—a spice to go potty with." *Financial Times*, March 11–12.
- Leonhardt, D. 2007. "Larry Summers's evolution." *New York Times Magazine*, June 10.
- Lex Column. 2007. "Securitisation." *Financial Times*, December 21.
- . 2008a. "All fall down." *Financial Times*, December 28.

- . 2008b. "Mark to market." *Financial Times*, October 1.
- . 2010. "Dark pools." *Financial Times*, April 7.
- . 2012. "Spanish banks." *Financial Times*, May 10.
- Lindert, P. 2004. "Social spending and economic growth." *Challenge* 47 (4): 6–16.
- Little, R. G. 2005. "Organizational culture and the performance of critical infrastructure: Modeling and simulation in socio-technological systems." In *Proceedings of the 38th Hawaii International Conference on System Sciences—2005*, 1–8. Washington: IEEE Computer Society.
- . 2009. "A cautionary tale to return to investment basics." Letter to the editor. *Financial Times*, October 7.
- Littlechild, S. 2002. *Regulators, Competition and Transitional Price Controls: A Critique of Price Restraints in Electricity Supply and Mobile Telephones*. London: Institute of Economic Affairs.
- London, S. 2003. "The growing pains of business." *Financial Times*, May 5.
- Lowenstein, R. 2008. "Long-Term Capital: It's a short-term memory." *New York Times*, September 7.
- Luijff, E., et al. 2008. "Empirical findings on critical infrastructure dependencies in Europe." The Hague: TNO Defence, Security and Safety and the Delft University of Technology (http://critiso8.dia.uniroma3.it/pdf/CRITIS_o8_40.pdf).
- . 2010. "Empirical findings on European critical infrastructure dependencies." *International Journal of System of Systems Engineering* 2 (1): 3–18.
- Lutz, W., B. O'Neill, and S. Scherbov. 2003. "Europe's population at a turning point." *Science* 299 (March 28): 1991–92.
- Lynn, B. 2005. *End of the Line: The Rise and Coming Fall of the Global Corporation*. New York: Doubleday.
- MacCormick, N. 2007. "Mr. Justice: Ronald Dworkin's troubled search for respectful politics, a moral law and the fundamentals of democracy." *TLS*, December 7, 3–5.
- MacKenzie, D. 2010. "Unlocking the language of structured securities." *Financial Times*, August 19.
- . 2012. "Dependence on Fed injections can be hard habit to kick." *Financial Times*, April 7–8.
- Mackenzie, M., and H. Sender. 2010. "Plunge in US equities remains a mystery." *Financial Times*, May 8–9.
- Malkiel, B. 2008. "Finding a way to regain trust in the battered financial system." *Financial Times*, November 13.
- Mallet, V. 2009. "Spanish in position." *Financial Times*, October 21.
- Manyika, J. 2006. "The coming imperative for the world's knowledge economy." *Financial Times*, May 16.
- March, J. 1966. "The power of power." In *Varieties of Political Theory*, edited by D. Easton, 39–70. Englewood Cliffs, N.J.: Prentice-Hall.
- Marcus, G. 2008. *Kluge: The Haphazard Construction of the Human Mind*. Boston: Houghton Mifflin.

- Marufu, L., et al. 2004. "The 2003 North American electrical blackout: An accidental experiment in atmospheric chemistry." *Geophysical Research Letters* 31: 1–4.
- Mason, C., and B. Simon. 2009. "Canada banks prove envy of the world." *Financial Times*, February 20.
- Masters, B. 2011. "Resistance to living wills could prove futile and foolish." *Financial Times*, August 23.
- . 2012a. "Investors lose faith in risk measures." *Financial Times*, May 24.
- . 2012b. "On-site supervisors are a dish worth tasting for the ECB." *Financial Times*, July 27.
- Maynard-Moody, S., and M. Musheno. 2003. *Cops, Teachers, Counselors: Stories from the Front Lines of Public Service*. Ann Arbor: University of Michigan Press.
- McDermott, J. 2003. *Economics in Real Time: A Theoretical Reconstruction*. Ann Arbor: University of Michigan Press.
- McDonald, O. 2009. "Not fair game to attack accounting for credit crisis." *Financial Times*, January 15.
- McKibben, B. 2007. "450 ways to stop global warming." *Foreign Policy*, May–June, 38–39.
- McNeil, D., Jr. 2008. "A pandemic that wasn't but might be." *New York Times*, January 22.
- McPhee, J. 2006. *Uncommon Carriers*. New York: Farrar, Straus and Giroux.
- Meltzer, A. 2010. "Market failure or government failure?" *Wall Street Journal*, March 19.
- Menn, J. 2012. "Thieves down the line." *Financial Times*, January 3.
- Miller, L. 2004. "Keep talking." *New York Times Book Review*, December 12.
- Minkler, M., and N. Wallenstein, eds. 2008. *Community-Based Participatory Research for Health: From Process to Outcomes*. 2nd ed. San Francisco: Jossey-Bass.
- Mintzberg, H. 1973. *The Nature of Managerial Work*. New York: Harper and Row.
- Mitroff, I., M. Alpaslan, and S. Green. 2004. "Crises as ill-structured messes." *International Studies Review* 6: 175–82.
- Mnookin, J. 2003. "Fingerprints: Not a gold standard." *Issues in Science and Technology* 20 (1): 47–54.
- Mollenkamp, C., and S. Ng. 2007. "Wall Street wizardry amplified credit crisis." *Wall Street Journal*, December 27.
- Mollenkamp, C., et al. 2008. "Lehman's demise triggered cash crunch around globe." *Wall Street Journal*, September 29.
- Morel, C., et al. 2005. "Health innovation networks to help developing countries address neglected diseases." *Science* 309 (July 15): 401–4.
- Morgenson, G. 2008. "Behind biggest insurer's crisis, a blind eye to a web of risk." *New York Times*, September 28.
- Mount, H. 2004. "Hellish nice." Review of *The Bugatti Queen*, by Miranda Seymour. *TLS*, February 27.

- Moynihan, D. 2005. *Leveraging Collaborative Networks in Infrequent Emergency Situations*. Washington: IBM Center for the Business of Government.
- Munchau, W. 2010. "Inflation must not become a moving target." *Financial Times*, February 22.
- Mustain, M. 2011. *Overcoming Cynicism: William James and the Metaphysics of Engagement*. New York: Continuum.
- Myers, N., and S. Pimm. 2003. "The last extinction?" *Foreign Policy*, March–April, 28–29.
- Nasiripour, S. 2012. "Pressure rises for break-up of US banks." *Financial Times*, May 24.
- National Commission on Terrorist Attacks upon the United States. 2004. *The 9/11 Commission Report: Final Report of the National Commission on Terrorist Attacks upon the United States*. New York: W. W. Norton.
- National Research Council. 2009. *Science and Decisions: Advancing Risk Assessment*. Washington: National Academies Press.
- Neurath, O. 1944. *Foundations of the Social Sciences*. Chicago: University of Chicago Press.
- "The Next Pandemic?" 2005. Special issue, *Foreign Affairs* 84 (4).
- Niederauer, D. 2009. "Principles that must guide new financial regulation." *Financial Times*, June 16.
- . 2010. "'Flash crash' shows need for price discovery and safeguards." *Financial Times*, May 27.
- . 2012. "It's time to bring 'dark pools' into the daylight." *Financial Times*, July 5.
- Nisbett, R. 2006. "Telling more than we can know" (<http://edge.org/responses/what-is-your-dangerous-idea>).
- Nocera, J. 2009. "Poking holes in a theory on markets." *New York Times*, June 6.
- Norris, F. 2008. "The patient is healthy but dead." *New York Times*, April 4.
- . 2009. "Politicians accused of meddling in bank rules." *New York Times*, July 28.
- Noyer, C. 2009. "A stronger infrastructure will cut CDS vulnerability." *Financial Times*, October 20.
- Nuttal, A. D. 2003. "Why scholarship matters." *Wilson Quarterly*, Autumn, 60–71.
- Oakley, D. 2008. "Search for quality gives public sector source of cheap funds." *Financial Times*, October 10.
- . 2010. "European countries overtake top companies in debt risk league." *Financial Times*, January 13.
- Oakley, D., J. Mackintosh, and A. Gangahar. 2008. "Peaks and troughs of a volatile month." *Financial Times*, February 1.
- O'Connor, S. 2008. "Financial risk 'plumbers' hope for Corrigan boom." *Financial Times*, August 22.
- O'Connor, S., and S. Grene. 2009. "Microfinance group in CDO scheme." *Financial Times*, November 12.

- Offer, A. 2006. *The Challenge of Affluence: Self-Control and Well-Being in the United States and Britain since 1950*. Oxford: Oxford University Press.
- O'Neill, J. 2006. "Globalisation should be praised—not diminished." Letter to the editor. *Financial Times*, September 14.
- Orasanu, J., and T. Connolly. 1993. "The reinvention of decision making." In *Decision Making in Action: Models and Methods*, edited by G. Klein, J. Orasanu, R. Calderwood, and C. Zsombok, 3–20. Norwood, N.J.: Ablex.
- Oremond, P. 2005. *Why Most Things Fail: Evolution, Extinction and Economics*. New York: Pantheon.
- Osterholm, M. T. 2005. "Preparing for the next pandemic." *Foreign Affairs* 84 (4): 24–37.
- . 2007. "Unprepared for a pandemic." *Foreign Affairs* 86 (2): 47–57.
- Ostrom, E. 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- . 2005. *Understanding Institutional Diversity*. Princeton: Princeton University Press.
- Oswald, A. 2006. "The hippies were right all along about happiness." *Financial Times*, January 19.
- Pacala, S., et al. 2003. "False alarm over environmental false alarms." *Science* 301 (August 29): 1187–88.
- Panagariya, A. 2003. "Book review." Review of *Imagine There's No Country* by S. S. Bhalla, *Journal of Economic Literature* 41 (December): 1288–89.
- Partnoy, F. 2007. "Markets abhor the vacuum left by derivatives." *Financial Times*, August 10.
- . 2009. "Prepare to bury the fatally wounded big banks." *Financial Times*, January 19.
- Patterson, O. 2002. "Comments made during a special conference on Afro-America at the start of a new century." *Salmagundi*, Winter–Spring.
- . 2007. "Jena, O.J. and the jailing of Black America." *New York Times*, September 30.
- Patterson, S. 2010. *The Quants: How a New Breed of Math Whizzes Conquered Wall Street and Nearly Destroyed It*. New York: Crown Business.
- Perrow, C. 2007. *The Next Catastrophe: Reducing Our Vulnerabilities to Natural, Industrial, and Terrorist Disasters*. Princeton: Princeton University Press.
- Persaud, A. 2009. "Boomtime politicians will never rein in the bankers." *Financial Times*, November 27.
- Peston, R., and L. Knight. 2012. *How Do We Fix This Mess? The Economic Price of Having It All and the Route to Lasting Prosperity*. London: Hodder and Stoughton.
- Peterson, P. 2009. "View from the top: Pete Peterson, chairman emeritus of Blackstone Group." *Financial Times*, July 17.
- Phillips, A. 1994. *On Flirtation*. Cambridge: Harvard University Press.
- . 2001. "Clutter: A case history." In A. Phillips, *Promises, Promises: Essays on Literature and Psychoanalysis*, 59–71. New York: Basic.
- . 2006. *Side Effects*. London: Hamish Hamilton.

- . 2010. *On Balance*. New York: Farrar, Straus and Giroux.
- Pizano, D. 2009. *Conversations with Great Economists*. New York: Jorge Pinto.
- Plender, J. 2005. "Shock of the new: A changed financial landscape may be eroding resistance to systemic risk." *Financial Times*, February 16.
- . 2006. "The credit business is more perilous than ever." *Financial Times*, October 13.
- . 2007. "Goldman's risk control offers right example of governance." *Financial Times*, December 5.
- . 2009a. "Banks let off the hook as flawed model is preserved." *Financial Times*, July 15.
- . 2009b. "Politics will help decide which financial centres win." *Financial Times*, May 13.
- . 2009c. "Respinning the web." *Financial Times*, June 22.
- . 2010a. "Blame the central bankers more than the private bankers." *Financial Times*, January 20.
- . 2010b. "Bond markets will be a nervous place for a while yet." *Financial Times*, December 1.
- . 2011a. "Bad habits of credit bubble make worrying comeback." *Financial Times*, February 23.
- . 2011b. "Bond vigilantes keep a close eye on ability to print money." *Financial Times*, August 17.
- . 2012. "Liborgate tells us banking behemoths are uncontrollable." *Financial Times*, July 18.
- Politi, J., F. Guerrera, and A. Rappeport. 2010. "Ex-Citi chiefs apologise for losses." *Financial Times*, April 9.
- Politi, J., and A. Rappeport. 2010. "Greenspan grilled over role in meltdown." *Financial Times*, April 8.
- Poole, W. 2008. "Treasury has no authority to coerce banks." *Wall Street Journal*, October 17.
- Popper, N. 2012. "BATS flaw not so rare, data shows." *New York Times*, March 29.
- Porter, R. 2000. *Enlightenment: Britain and the Creation of the Modern World*. London: Penguin.
- Prasad, E., and K. Rogoff. 2003. "The emerging truth about going global." *Financial Times*, September 2.
- Price, T. 2009. "Beware the bubble's distorted allure." *Financial Times*, August 25.
- Proffitt, F. 2004. "U.K. court quashes Bangladesh arsenic case." *Science* 303 (February 27): 1271.
- Pronin, E. 2008. "How we see ourselves and how we see others." *Science* 320 (May 30): 1177–80.
- Quirk, W. 2012. "Too big to fail and too risky to exist." *The American Scholar*, Autumn, 31–43.
- Raeburn, R. 2009. "Brussels must stick up for the end-users of derivatives." *Financial Times*, December 2.

- Rajan, R. 2010. *Faultlines: How Hidden Fractures Still Threaten the World Economy*. Princeton: Princeton University Press.
- Ramanathan, V., and T. Barnett. 2003. "Experimenting with Earth." *Wilson Quarterly*, Spring, 78–84.
- Rappeport, A. 2010. "Executives raced to beat markets." *Financial Times*, April 17–18.
- Revkin, A. 2002. "Forget nature. Even Eden is engineered." *New York Times*, August 20.
- . 2006. "Mystery of methane levels in 90's seems solved." *New York Times*, September 28.
- . 2009. "Campaign to reduce carbon dioxide levels picks a number to make a point." *New York Times*, October 25.
- Riddle, J. 2007. "Brave new beef: Animal cloning and its impacts." *Brown Journal of World Affairs* 14 (1): 111–19.
- Rigby, R. 2008. "In defence of the messy workstation." *Financial Times*, May 29, 10.
- Ringen, S. 2003. "Fewer people: A stark European future." *TLS*, February 28, 9–11.
- Rittel, H., and M. Webber. 1973. "Dilemmas in a general theory of planning." *Policy Sciences* 4: 155–69.
- Roach, S. 2008. "Time is ripe for authorities to be decisive and opt for overkill." *Financial Times*, October 9.
- Robbins, T. 2007. "The plane truth." *Guardian Weekly*, July 20.
- Roberts, L. 2011. "9 billion?" *Science* 333 (July 29): 540–43.
- Rochlin, G. 1993. "Defining 'high reliability organizations' in practice: A taxonomic prologue." In *New Challenges To Understanding Organizations*, edited by K. Roberts, 11–32. New York: Maxwell Macmillan International.
- Rodrigues, A., et al. 2009. "Boom-and-bust development patterns across the Amazon deforestation frontier." *Science* 324 (June 12): 1435–37.
- Roe, E. 1989. "The zone of acceptance in organization theory: An explanation of the Challenger accident." *Administration and Society* 21 (2): 234–64.
- . 1994. *Narrative Policy Analysis: Theory and Practice*. Durham: Duke University Press.
- . 1998. *Taking Complexity Seriously: Policy Analysis, Triangulation, and Sustainable Development*. Norwell, Mass.: Kluwer.
- . 1999. *Except-Africa*. New Brunswick, N.J.: Transaction.
- . 2004. "Real-time ecology." Letter to the editor. *BioScience* 54 (8): 716.
- . 2007. "Narrative policy analysis for decision making." In *Handbook of Decision Making*, edited by Goktug Morcol, 607–26. Boca Raton, Fla.: CRC Press.
- . 2009. "Preventing transboundary crises: The management and regulation of setbacks." *Review of Policy Research* 26 (4): 457–71.
- . 2011. "Surprising answers to rising sea levels, storms, floods, desertification, earthquakes and ever more environmental crises in Califor-

- nia's Sacramento–San Joaquin Delta." *Journal of Contingencies and Crisis Management* 19 (1): 34–42.
- Roe, E., and E. Lindquist. 2003. "The challenges of policy analysis: Linking discipline, profession, and management education." Paper prepared for the Association for Public Policy Analysis and Management's 25th Research Conference, Washington.
- Roe, E., and P. Schulman. 2008. *High Reliability Management: Operating on the Edge*. Stanford: Stanford University Press.
- Roe, E., and M. J. G. van Eeten. 2001. "The heart of the matter: A radical proposal." *Journal of the American Planning Association* 67 (1): 92–98.
- Roe, E., et al. 2002. *California's Electricity Restructuring: The Challenge to Providing Service and Grid Reliability*. Palo Alto, Calif.: Electrical Power Research Institute.
- . 2005. "High reliability bandwidth management in large technical systems: Findings and implications of two case studies." *Journal of Public Administration Research and Theory* 15: 263–80.
- Rosanvallon, P. 2000. *The New Social Question: Rethinking the Welfare State*. Translated by B. Harshav. Princeton: Princeton University Press.
- Rosenberg, D. 2012. "The world is not fixed and this equity rally lacks conviction." *Financial Times*, March 15.
- Rosenthal, E. 2006. "W.H.O. to study bird flu deaths in family." *New York Times*, May 25.
- Rothschild, E. 2001. *Economic Sentiments: Adam Smith, Condorcet, and the Enlightenment*. Cambridge: Harvard University Press.
- Runciman, D. 2012. "Will we be all right in the end?" *London Review of Books*, January 5, 3–5.
- Ryle, G. 1949. *The Concept of Mind*. London: Hutchinson's University Library.
- Saks, M., and J. Koehler. 2005. "The coming paradigm shift in forensic identification science." *Science* 309 (August 5): 892–95.
- Samuelson, P. 2009. "The resurrection of Keynes." *New Perspectives Quarterly* 26 (2): 42–44.
- Samuelson, R. 2011. "Rethinking the great recession." *Wilson Quarterly*, Winter, 16–24.
- Sanchez, P., and M. Swaminathan. 2005. "Cutting world hunger in half." *Science* 307 (January 21): 357–59.
- Sanger, D. 2009. "The 31-year old who is dismantling G.M." *New York Times*, June 1.
- Santos, F. 2007. "Evidence from bite marks, it turns out, is not so elementary." *New York Times*, January 28.
- Sapir, A. 2005. *Globalisation and the Reform of European Social Models*. Breugel Policy Brief, Issue 2005/01 (<http://www.bruegel.org/publications/publication-detail/publication/31-globalisation-and-the-reform-of-european-social-models/>).
- Sass, L. 2003. "Lacan and 9/11." *Raritan* 23 (1): 162–66.

- Scannell, K. 2008. "Regulators ease securities-valuation rules." *Wall Street Journal*, October 1.
- Schell, J. 2008. "Remarks on 'Nuclear Terror and Other Evils.'" *Salmagundi*, Spring–Summer, 229–31.
- Schelling, T. 1978. *Micromotives and Macrobehavior*. New York: W. W. Norton.
- Schlesinger, A., Jr. 1997. "Has democracy a future?" *Foreign Affairs* 76 (5): 2–12.
- Scholtes, S. 2008. "Volcker urges extended role for the Fed." *Financial Times*, April 9.
- Schulman, P. R. 1993. "The negotiated order of organizational reliability." *Administration and Society* 25: 353–72.
- Schulman P. R., et al. 2004. "High reliability and the management of critical infrastructures." *Journal of Contingencies and Crisis Management* 12 (1): 14–28.
- Schütz, A. 1964. *Alfred Schütz, Collected Papers*. Vol. 2, *Studies in Social Theory*. Edited and introduced by A. Brodersen. The Hague: Martinus Nijhoff.
- Schwartz, J. 2012. "Freight train late in Charlotte? Blame Chicago." *New York Times*, May 8.
- Schwartz, P., P. Leyden, and J. Hyatt. 1999. *The Long Boom: A Vision for the Coming Age of Prosperity*. New York: Perseus/Basic.
- Science. 2012. "By the numbers." 336 (June 29): 1626.
- Scoones, I., ed. 1996. *Living with Uncertainty: New Directions in Pastoral Development in Africa*. Exeter, U.K.: Intermediate Technologies.
- Sender, H., and J. Crabtree. 2012. "Powerless to act." *Financial Times*, August 6.
- Sengupta, S. 2012. "With advanced warning, preparing for hackers' attack on the Internet." *New York Times*, March 31.
- Sennett, R. 2008. *The Craftsman*. New Haven: Yale University Press.
- Shackle, G. L. S. 1969. *Decision, Order and Time in Human Affairs*. Cambridge: Cambridge University Press.
- Sharma, S. 2005. "The encouraging truth about foreign aid." *Challenge* 48 (4): 11–25.
- Shattuck, R. 1996. *Forbidden Knowledge*. New York: Harcourt Brace.
- Shatz, A. 2010. "Desire was everywhere." *London Review of Books*, December 16, 9–12.
- Shaw, G. B. 1907. "A nation of villagers." *Everybody's Magazine*, December, 861–65.
- Sheffi, Y. 2005. *The Resilient Enterprise*. Cambridge: MIT Press.
- Sherman, S., M. Crawford, and A. McConnell. 2004. "Looking ahead as a technique to reduce resistance to persuasive attempts." In *Resistance and Persuasion*, edited by E. Knowles and J. Linn, 149–74. Mahwah, N.J.: Lawrence Erlbaum.
- Shiller, R. 2003. "Financial markets and risk: Solving social problems; Interview with Robert Shiller." *Challenge* 46 (3): 124–34.

- . 2012. *Finance and the Good Society*. Princeton: Princeton University Press.
- Sidel, R. 2009. "FDIC poised to split banks to lure buyers." *Wall Street Journal*, July 30.
- Siegel, J. 2008. "Liquidity and lending rates are crucial to confidence." *Financial Times*, October 15.
- Silvergate, H. 2009. "The decline and fall of mens rea." *Champion*, September–October, (accessed online on April 1, 2010, at <http://www.nacdl.org/champion.aspx?id=14738>).
- Silverman, G. 2003. "High-risk lending may be hit by Basel rules, US banks say." *Financial Times*, September 15.
- Skapinker, M. 2003. "Being spoilt for choice." *Financial Times*, March 12.
- Smith, A. 1759. *Theory of Moral Sentiments* (accessed online on December 20, 2011, at http://oll.libertyfund.org/?option=com_staticxt&staticfile=show.php%3Ftitle=192).
- Smith, P. 2010. "Global bank tax plans misguided, says Australian regulator." *Financial Times*, April 24–25.
- Solomon, D., and D. Paletta. 2009. "Wall Street on Geithner's speed dial." *Wall Street Journal*, October 9.
- Sorensen, R. 1992. *Thought Experiments*. New York: Oxford University Press.
- Sorkin, A. R. 2008. "The hand behind the deal." *New York Times*, March 25.
- . 2009. *Too Big to Fail: The Inside Story of How Wall Street and Washington Fought to Save the Financial System—and Themselves*. New York: Viking.
- . 2010. "What the financial crisis commission should ask." *New York Times*, January 12.
- Sorkin, A. R., et al. 2008. "36 hours of alarm and action as crisis spiraled." *New York Times*, October 2.
- Soros, G. 2008. "America must lead a rescue of emerging economies." *Financial Times*, October 29.
- Sri-Kumar, K. 2011. "Inflation risks will continue to weigh on Indian equities." *Financial Times*, March 2.
- Stanford, P. K. 2006. *Exceeding Our Grasp: Science, History, and the Problem of Unconceived Alternatives*. New York: Oxford University Press.
- Stapleton, L. 2010. "No definitive formula to solve wicked problems." Letter to the editor. *Financial Times*, February 1.
- Steil, B. 2008. "We need a 'safe-fail' approach to avert new crises." *Financial Times*, November 21.
- Stone, D. 2002. *Policy Paradox: The Art of Political Decision Making*. Rev. ed. New York: W. W. Norton.
- Story, L. 2009. "For private equity, a very public disaster." *New York Times*, August 9.
- Sull, D., and B. Bryant. 2006. "More than idle chatter." *Financial Times*, April 7.
- Summers, L. 2008. "Six principles for a new regulatory order." *Financial Times*, June 2.

- Sunstein, C. 2007. *Worst-Case Scenarios*. Cambridge: Harvard University Press.
- Tabb, L. 2007. "Transparency would muddy the waters in OTC system." *Financial Times*, December 11.
- Tait, N. 2003. "Scientists to face legal action over Bangladesh water survey." *Financial Times*, May 9.
- Talbott, S. 2008. "A pressing need to master the tyranny of the urgent." *Financial Times*, November 3.
- Tallis, R. 2008. "The neuroscience delusion." *TLS*, April 9.
- Tavakoli, J. 2009. "The China syndrome: It's our fault they don't trust us." *Financial Times*, February 5.
- Taylor, J. 2009. *Getting off Track: How Government Actions and Interventions Caused, Prolonged, and Worsened the Financial Crisis*. Stanford, Calif.: Hoover Institution Press.
- Tett, G. 2005. "More opacity is dangerous in financial markets." *Financial Times*, October 21.
- . 2006a. "The dream machine." *Financial Times*, March 25–26.
- . 2006b. "Why \$6bn hedge fund loss left the finance world unruffled." *Financial Times*, September 22.
- . 2007a. "Credit turmoil shows not all innovation has been beneficial." *Financial Times*, September 11.
- . 2007b. "Derivatives bring drama to Davos." *Financial Times*, February 1.
- . 2007c. "Why financiers have missed the new monster." *Financial Times*, September 7.
- . 2008a. "Always the pragmatist, Geithner gets the job done." *Financial Times*, November 25.
- . 2008b. "Seniority brings a false sense of security." *Financial Times*, October 7.
- . 2009a. "Bankers and bureaucrats seek a new philosophy." *Financial Times*, January 28.
- . 2009b. "Financial world is stumbling blindly through a cognitive fog." *Financial Times*, March 6.
- . 2009c. "Ghost of AIG refuses to fade as CDS data remains elusive." *Financial Times*, September 25.
- . 2009d. "Good idea that turned bad when no one was looking." *Financial Times*, March 17.
- . 2009e. "How Markit turned from a camera into an engine." *Financial Times*, July 17.
- . 2010. "Deleveraging out of the debt mire will be an unsavoury task." *Financial Times*, January 15.
- . 2012. "Europe could learn from America's debt scramble." *Financial Times*, January 27.
- Tett, G., C. Freeland, and T. Braithwaite. 2010. "Bankers to lobby regulators for softer reforms." *Financial Times*, January 25.
- Thackara, J. 2006. *In the Bubble: Designing in a Complex World*. Cambridge: MIT Press.

- Thal Larsen, P. 2008. "British watchdog calls for overhaul of rules." *Financial Times*, October 17.
- . 2009. "Gloves to come off as FSA ends 'light touch' era." *Financial Times*, March 13.
- Thal Larsen, P., and C. Giles. 2009. "Self-assembly solution: The Swedish model." *Financial Times*, March 18.
- Thal Larsen, P., and F. Guerrero. 2008. "Never glad confident morning again?" *Financial Times*, September 27–28.
- Thomas, L., Jr. 2006. "A \$31 billion gift between friends." *New York Times*, June 27.
- Thomas, N. 2003. *Cook: The Extraordinary Voyages of Captain James Cook*. New York: Walker and Company.
- Thompson, M. 1979. *Rubbish Theory: The Creation and Destruction of Value*. Oxford: Oxford University Press.
- . 1993. "The meaning of sustainable development." Paper presented at the Global Governability Conference, Centre for Global Governance, London School of Economics, April 20.
- Thompson, M., R. Ellis, and A. Wildavsky. 1990. *Cultural Theory*. Boulder, Colo.: Westview.
- Todorov, T. 2009. *In Defence of the Enlightenment*. Translated by G. Walker. London: Atlantic.
- Trickett, S., C. Schunn, and J. G. Trafton. 2005. "Puzzles and peculiarities: How scientists attend to and process anomalies during data analysis." In *Scientific and Technological Thinking*, edited by M. Gorman et al., 97–118. Mahwah, N.J.: Lawrence Erlbaum.
- Trotter, D. 2000. *Cooking with Mud: The Idea of Mess in Nineteenth-Century Art and Fiction*. Oxford: Oxford University Press.
- Turner, A. 2012. *Economics after the Crisis: Objectives and Means*. Cambridge: MIT Press.
- Unger, R. M. 2005. *What Should the Left Propose?* London: Verso.
- United Nations, Department of Economic and Social Affairs, Population Division. 2003. *World Population in 2300: Highlights*. New York: United Nations.
- Upton, J. 2012. "An upside to China's air pollution: More snowfall in the Sierra Nevada." *New York Times*, February 17.
- Valentine, J. 2005. "Business must plan for worst, and hope for the best." *Financial Times*, July 25.
- Valukas, A. 2010. "Report of Anton R. Valukas, Examiner," vol. 2. *In re Lehman Brothers Holdings Inc., et al., Debtors*, US Bankruptcy Court, Southern District of New York (<http://lehmanreport.jenner.com>).
- van den Bergh, C., and P. Rietveld. 2004. "Reconsidering the limits to world population: Meta-analysis and meta-prediction." *Biosciences* 54 (3): 195–204.
- van Duyn, A. 2008. "Economist Kaufman says Fed failed as regulator." *Financial Times*, April 14.

- . 2010a. "Clearing houses need some inspiration from luxury goods." *Financial Times*, January 16–17.
- . 2010b. "Study highlights CDS shortcomings." *Financial Times*, October 12.
- van Duyn, A., M. Mackenzie, and G. Tett. 2009. "Regulators put CDS pricing in focus." *Financial Times*, July 24.
- van Duyn, A., and G. Tett. 2009. "Sustainable markets." In *Future of Markets* supplement, *Financial Times*, October 30.
- van Eeten, M. J. G., and E. Roe. 2002. *Ecology, Engineering and Management: Reconciling Ecological Rehabilitation and Service Reliability*. New York: Oxford University Press.
- Vanderbilt, T. 2008. "The traffic guru." *Wilson Quarterly*, Summer, 29–32.
- Vespignani, A. 2009. "Predicting the behavior of techno-social systems." *Science* 325 (July 24): 425–28.
- Victor, D. 2006. "Recovering sustainable development." *Foreign Affairs* 85 (1): 91–103.
- Volcker, P. 2008. "We have the tools to manage the crisis." *Wall Street Journal*, October 10.
- Walker, M. 2009. "The world's new numbers." *Wilson Quarterly*, Spring, 24–31.
- Wallison, P. 2007. "America will prefer to rely on rules, not principles." *Financial Times*, July 6.
- Watson, P. 2010. *The German Genius: Europe's Third Renaissance, the Second Scientific Revolution, and the Twentieth Century*. New York: HarperCollins.
- Weick, K. E., and K. M. Sutcliffe. 2007. *Managing the Unexpected: Resilient Performance in an Age of Uncertainty*. San Francisco: Jossey-Bass.
- Weisbord, M., and S. Janoff. 1995. *Future Search*. San Francisco: Berrett-Koehler.
- Weiser, B. 2011. "In New Jersey, sweeping shift on witness IDs." *New York Times*, August 25.
- Werdigier, J. 2008. "A nationalized Northern Rock curtails its products as deposits surge." *New York Times*, October 3.
- Whalen, C. 2008. "Banks wallow in the muddy waters of 'fair value' rules." *Financial Times*, March 6.
- Wigglesworth, R., A. Sakoui, and S. Kerr. 2009. "Utility's \$2bn debt woe raises pressure on Dubai." *Financial Times*, December 9.
- Williamson, T. 1994. *Vagueness*. London: Routledge.
- Willman, J. 2008. "Full impact of banking crisis aftershocks is anyone's guess." *Financial Times*, November 16.
- Wilson, J. 2010. "A disorderly descent." *Financial Times*, February 2.
- Wilson, J. Q. 1989. *Bureaucracy: What Government Agencies Do and Why They Do It*. New York: Basic.
- Wilson, T., and J. Schooler. 1991. "Thinking too much: Introspection can reduce the quality of preferences and decisions." *Journal of Personality and Social Psychology* 60 (2): 181–92.

- Wilson Quarterly. 2012. "Don't blame bonuses." Spring, 64.
- Winston, C. 1998. "U.S. industry adjustment to economic deregulation." *Journal of Economic Perspectives* 12 (3): 89–110.
- Wirth, T., C. B. Gray, and J. Podesta. 2003. "The future of energy policy." *Foreign Affairs* 82 (4): 132–55.
- Wolf, M. 2003. "People, plagues and prosperity." *Financial Times*, February 27.
- . 2004. "We need more globalization—but we will only get it if we have better states." *Financial Times*, May 10.
- . 2005. "More public spending does not lead to slower growth." *Financial Times*, March 23.
- . 2007. "Why banking is an accident waiting to happen." *Financial Times*, November 28.
- . 2008a. "The end of lightly regulated finance has come far closer." *Financial Times*, September 17.
- . 2008b. "What to do with Britain's banks." *Financial Times*, December 11.
- . 2009. "The cautious approach to fixing banks will not work." *Financial Times*, July 1.
- . 2010. "The challenge of halting the financial doomsday machine." *Financial Times*, April 21.
- Wood, C. 2009. "Swedish model for Western banks." *Financial Times*, January 20.
- World Health Organization. 2007. *Informal Meeting to Review Water Supply and Sanitation Sector Assessment Guidelines*. Manila: World Health Organization Regional Office for the Western Pacific.
- Wright, R. 2008. "Dead wait: Shipping." *Financial Times*, December 18.
- . 2009. "Slide in trade leaves a glut of capacity." *Financial Times*, May 26.
- Wright, B., and T. Okey. 2004. "Creating a sustainable future?" Letter to the editor. *Science* 304 (June 25): 1903.
- Wu, D. 2008. *William Hazlitt: The First Modern Man*. Oxford: Oxford University Press.
- Yergin, D. 2009. "A crisis in search of a narrative." *Financial Times*, October 21.
- Zaloom, C. 2006. *Out of the Pits: Traders and Technology from Chicago to London*. Chicago: University of Chicago Press.
- Zamiska, N., and M. Pottinger. 2005. "Two experts in China dispute bird-flu risks." *Wall Street Journal*, July 19.
- Zimmerman, R. 2004. "Decision-making and vulnerability of critical infrastructure." Paper presented at the IEEE International Conference on Systems, Man and Cybernetics.
- Zuckerman, G., and J. Strasburg. 2009. "Hedge-fund holders hurt as managers act like herd." *Wall Street Journal*, January 2–4.

INDEX

- Acheson, Dean, 89
Ackoff, Russell, 11, 115
African Americans, 160–61n18
AIG, 58, 64, 99
Amaranth, 23
anticipations. *See under* pattern recognition
Aronson, Jeffrey, 57
Ascherson, Neal, 89
avian flu, 72–73

bad messes, 4, 7–13; bad mess management vs., 56, 76–77; defined, 8; financial crisis as, 26–27, 31; innovation as cause of, 10, 115, 152; minimizing, 6; role of professionals, 53; types of, 62–77; unstudied conditions and, 22, 26
Bair, Sheila, 14, 144
Basel Committee on Banking Supervision, 94
Bayesian analysis, 164n4
Bear Stearns, 14, 24, 100
Becker, Gary, 65
Bentham, Jeremy, 69
Berger, John, 154
Bernanke, Ben, 27, 144
better practices, 7, 41–42, 49–50, 118, 153; in banking and finance, 144; pattern recognition and, 37, 65; in real-time economics, 92; recoupling and, 49; street-level judgment and, 41; use of term, 49, 65; on volatility, 78–79
Bill and Melinda Gates Foundation, 134
Blankfein, Lloyd, 22, 166n14
Buffett, Warren, 11, 103, 134
Burt, Ronald, 170–71n15

Caldwell, Christopher, 16
California Independent System Operator (CAISO), 83, 112–13
cascades, 29–30. *See also* contagion
CDO. *See* collateralized debt obligation
CDs. *See* credit default swaps
Citibank study, 58
Citigroup, 64, 99
climate change, 13, 43, 45, 67, 71–72, 131
clutter, 11, 12, 135, 157n6
collateralized debt obligation (CDO), 10
common pool resource (CPR) institutions, 74
contagion, 10, 28–29, 30, 31, 84. *See also* cascades
contingency scenarios. *See* scenario formulation
coordination, 38, 39
coping organizations, 123–25
Corrigan, Gerard, 61, 128
coupling-decoupling-recoupling
dynamic: of critical infrastructures, 18; of financial derivatives, 108, 148, 150–51; as mess management, 48–49; real-time services and, 108; of resilience and anticipation, 101
CPR. *See* common pool resource institutions
craft organizations, 123–25
credit default swaps (CDs), 130, 145
Crick, Francis, 43
crisis management, 13–15, 35, 100, 103
critical infrastructures: disruptions, study of, 29–30; failure ratios of, 82; human error and, 111, 114; interconnected, 27–31, 84–85, 145,

critical infrastructures (*cont.*)

158n12; just-for-now conditions, 24–25; just-on-time conditions, 135; macro design in, 128; management skills for, 1; as mess management, 13–14, 17; real-time ecology of, 90–91, 107–8, 147; reliability management of, 17–18, 34, 146–47; resilience and, 30–31

cultures, types of, 119–22, 126

decisionmaking: macro design/micro operations and, 51–52; network-centered, 95–98, 104, 142; problem-centered, 96–98

decoupling. *See* coupling-decoupling-recoupling dynamic

Delft University of Technology, 29–30

Depository Trust & Clearing Corporation, 61–62

De Quincey, Thomas, 4

deregulation, 63–64, 109

Diamond, Jared, 43

domain of competence, 37–40, 57–58, 85, 100–101, 110–11, 133, 138, 146

Douglas, Mary, 120–22

Dr. Strangelove (film), 137

Economist (journal), 16

Efficient Market Hypothesis, 63

egalitarian culture, 120–22

Eisenhower, Dwight, 143

Eliot, T. S., 64

environmental messes, 13, 130–31, 162n9. *See also* climate change

Enzensberger, Hans Magnus, 78

falling rate of profit, law of, 91

Fannie Mae, 23, 64

FAO. *See* Food and Agriculture Organization

fatalist culture, 120–22

FCIC. *See* Financial Crisis Inquiry Commission

Federal Reserve, 24, 93, 99–100, 116

Feldstein, Martin, 116–17, 155n6

Ferguson, Adam, 134

Ferguson, Niall, 85

Ferguson, Roger, 167–68n23

Financial Crisis Inquiry Commission (FCIC), 14, 27, 29, 111, 148

financial derivatives: as bad mess, 38; coupling/decoupling, 108, 151; experienced traders on, 93; regulation of, 69–70, 108; risk in, 10–11, 25–26, 108–9

financial messes, 2, 22–27, 50–53;

bad mess in, 26–27, 31; better management of, 144–49; critical infrastructures and, 27–31, 84–85, 145, 158n12; decoupling in, 148, 151; good mess in, 31; leaps of faith in, 69–70; limits of, 22–27; market failure in, 150–51; moral hazard of, 16, 152; organization types and, 124; pricing difficulties in, 149; professionals' role, 52–53; real-time economics and, 91–95; recoupling in, 150; setback management of, 99–105; unstudied conditions of, 58–59, 85, 100, 152

Financial Times (newspaper), 14, 23–24, 50, 57, 140

Fisher, Ken, 80

flexibility, 20, 48, 115, 134–35

Food and Agriculture Organization (FAO), 42–43

forensic science, 59–60

Freddie Mac, 23, 64

Friedman, Benjamin, 157–58n11

Friedman, Jeffrey, 76

Friends of the Earth, 67

Fromanger, Gérard, 54

Geithner, Timothy, 10, 93

geoengineering, 131

Geuss, Raymond, 70

Gigerenzer, Gerd, 88

Gilbert, Daniel, 76–77, 117

global carrying capacity, 44–45, 130

globalization, 50–51

global warming. *See* climate change

Gokhale, Jagdish, 116

Goldman Sachs, 50, 53, 166n14

good messes, 4, 7–13; critical infrastructures and, 27–31; defined, 12, 78; in financial crisis, 31; known patterns/scenarios in, 38; reliability and, 6–7, 22; role of professionals, 53

Gramlich, Ned, 103, 167n22

Grantham, Jeremy, 70

Greenspan, Alan, 16, 117, 148

grid sociality, 120

Groopman, Jerome, 65

group sociality, 120

Hamilton, Alexander, 160n16

Harvard Business Review (journal), 11

Hayek, Friedrich von, 94–95, 159n8

healthcare messes, 63, 72–73, 86, 116, 138–39

Heller, Miriam, 28

hierarchist culture, 120–22

hubs: confusion over, 64–68; macro design and, 62–64; of mess and reliability space, 34–35, 56, 60, 79, 87, 133

human rights, 68–69

Hume, David, 9, 64

Hurricane Katrina, 101–3

illiquidity, 115, 124, 149

improvisation, 135–36

incrementalism, 5, 38; with capital “T”, 49

individualist culture, 120–22

interdependence, 9, 50, 60

International Covenant on Economic, Social, and Cultural Rights, U.N., 68

James, William, 139

JPMorgan, 24, 53, 58

just-for-now performance, 20–21, 88, 142; in critical infrastructures, 24–25, 111; pattern recognition and, 94; reliability violations and, 111; volatility and, 67

just-in-case performance, 19–20; by banks, 23; volatility and, 67

just-on-time performance, 20, 142;

improvisation in, 135–36; liquidity and, 23, 150; volatility and, 25, 67, 88

just-this-way performance, 21; command-and-control measures, 23–24; volatility and, 67

Kaufman, Henry, 93–94, 173n6

Kay, Alan, 97

Kay, John, 10, 27–28

Kennedy, Donald, 60

Kennel, Charles, 71–72

Keynes, Maynard, 84, 91

King, David, 162n10

Klein, Gary, 165n11

knowledge bases/scope, 34–36, 49, 71, 114

Kohn, Don, 167–68n23

Kotlikoff, Laurence, 85, 116

Krugman, Paul, 24

labor unions. *See* unionization

Law, John, 80

LCH.Cleartnet, 61

leaps of faith, 68–77

learning, 6, 38–39, 49, 79, 96, 110–11, 118, 126, 152

Lehman Brothers, 27, 30, 56–57, 61–62, 64, 99

liquidity: dark pools of, 61; defined, 23; high-frequency trading and, 150–51; illiquidity and, 115, 149; of overnight banking, 150; regulators on, 144; volatility and, 25

Locke, John, 9

Long-Term Capital Management, 57, 160n15

Luijff, Eric, 31

Mack, John, 93

macro design: arsenic in, 140; decisionmaking and, 51–52; on financial globalization, 50–51; global carrying capacity and, 44–45; hub/standpoint and, 62–64; leaps of faith in, 68–71; local scenarios and, 72–74; micro operations and, 35–36, 38–40, 51–52, 59–60, 101,

macro design (*cont.*)

110–15, 128, 142; pattern recognition and, 48, 51, 66, 71–75; as principles, 132–33

Malkiel, Burton, 10

mailbox illusion, 141

Mandelbrot, Benoît, 58–59

market failures, 150–51

Marx, Karl, 91

mess and reliability management:

cleaning up vs., 5–6; crisis management vs., 13–15; of critical infrastructures, 13–14, 17–18, 34; knowledge bases/scope in, 34–36, 49; macro design principles and, 132–33; need for, 2; pattern recognition in, 36–37; principal features of, 32–33; real-time, 89; rethinking, 131–37; skills required, 4, 6, 33; societal challenges in, 106; translation and, 6. *See also* financial mess

mess and reliability professionals, 3–4, 34–42; becoming, 86–89; challenges, 140–43; coordination by, 39; culture type of, 122; decision-making, network-centered, 95–98, 104, 142; domain of competence, 37–40, 57–58, 85, 100–101, 110–11, 133, 138, 146; financial crisis (“plumbers”) and, 52–53; knowledge/scope and, 35; on macro design, 40–41; on overpopulation, 45–50; policy messes and, 53–54, 56; recognition/protection of, 82–86; rethinking professionalism, 137–40; skill sets of, 6, 33–37, 53; on standpoints, 79; on stereotyping, 40; use of term, 158n1. *See also* specific skill sets, e.g. pattern recognition

mess and reliability space, 35, 46, 110, 126; crisis in, 101; economic sciences and, 91; human error and, 111, 114; mapping, 87; politics of volatility and, 119; principal hubs of, 34–35, 56, 60, 79, 133; professionalism and, 135, 138; system in, 159n15

messes, 4–8; performance modes as, 21–22; problematic cycles of, 106–10; role of, 3; use of term, 2, 11; wicked policy problems and, 5. *See also* bad messes; good messes; policy messes

micro operations/macro design, 35–36, 38–40, 51–52, 59–60, 101, 110–15, 128, 142; leaps of faith in, 68–71

Mintzberg, Henry, 88

Montesquieu, Baron de, 52

Morgan Stanley Asia, 27

national debt, 116

network-centered decisionmaking, 95–98, 104, 136, 142

Neurath, Otto, 134

No Child Left Behind Act (2001), 85

operational redesign, 132–33

options variety: defined, 18–20; just-for-now performance and, 24; volatility and, 19, 21, 25, 119–20, 122, 125–26

organizations, types of, 123–25

Ostrom, Elinor, 74

OTC (over-the-counter) derivatives.

See financial derivatives

outputs/outcomes, 122–23, 126

overpopulation, 42–50; global carrying capacity and, 44–45; mess and reliability professionals on, 45–50; policy mess management of, 46

Palmerston, Lord, 9

pandemics, 72–73

Pareto’s law of unchangeable inequality of income, 91

Partnoy, Frank, 169n7

pattern recognition: anticipations

based on, 37, 54, 65–66, 72, 73, 92; as basis for risk assessment/management, 39, 65–66; business continuity and, 65–66; in good messes, 38; just-for-now performance and, 94; localized scenario formulation and, 35, 38, 45–46, 49, 54, 64–66, 72–73, 81, 92; macro

design and, 48, 51, 66, 71–75; as mess management skill, 6, 36–37, 41; micro operations and, 132; outputs/outcomes and, 122–23, 126; in prediction, 66–67; real-time, 145; reliability and, 36–37

Paulson, Henry, 14, 25, 93, 144, 157n9
performance modes as their own messes, 21–22. *See also* specific types, e.g., just-for-now performance

Persaud, Avinash, 159n9

Phillips, Adam, 11–12, 135–36

Plender, John, 108, 132

policy messes: analysis process in, 166–67n18; best vs. worst, 21–31; better practices in, 144; culture types and, 121; defined, 3, 8–9, 53; future as, 115–27; networked decisionmaking in, 95–98; organization types and, 123–25; in overpopulation management, 46; rethinking, 129–31; role of professionals, 53–54, 56; of subsidies, 130; unstudied conditions of, 121. *See also* financial mess

policy narrative, 4, 44, 47–50, 72

politics: conventionally defined, 118–19, 129; and volatility/options, 119–26

population growth. *See* overpopulation

Prasad, Eswar, 51

prediction, 66–67, 117

procedural organizations, 123–25

production organizations, 123–25

professionalism: challenges, 137–40, 140–43; rethinking, 137–40

Reality Numbers One, Two, and Three, 128–29, 136–137, 140

real-time ecology, 90–91, 107–8, 147

real-time economics, 91–95, 148

real-time infrastructures. *See* critical infrastructures

real-time professions, 89

recoupling. *See* coupling-decoupling-recoupling dynamic

regulation(s): circumvention of, 149; of financial derivatives, 69–70; resilience and, 167n20; role of, 145; types of, 92; updating, 143

reliability: challenges in, 7, 151; defined, 8, 17; as measurable, 9; nonfungibility theory in, 146; problematic cycles of, 106–10; real-time, 101, 107, 136; violations, 111; volatility and, 67. *See also* mess and reliability space
reliability management. *See* mess and reliability management
reliability space. *See* mess and reliability space

resilience, 30–31, 79, 100–102, 152–53, 167n20

risk: defined, 92–93; known, 79; performance modes and, 20–22, 26, 39; stability and, 16, 159n9

risk assessment/management: irrational assessment, 165n10; models, 59, 94; pattern recognition/scenario formulation and, 65–66; post-9/11, 65–66; real-time operations and, 23; unstudied conditions vs., 58

Rivlin, Alice, 100

Rogoff, Kenneth, 51

Rohatyn, Felix, 4

Rosanvallon, Pierre, 153

Rovin, Sheldon, 115

Ryle, Gilbert, 75

Samuelson, Paul, 58, 94

Samuelson, Robert, 16

Santander, 66

SARS, 72

Say's Law, 91

scenario formulation, 37, 145; of good messes, 38; localized, 35, 38, 45–46, 49, 54, 64–66, 72–73, 81, 92; macro design and, 72–73, 132; as mess management skill, 6; outputs/outcomes and, 122–23; as worst case, 39, 65–66

Schiller, Friedrich, 136

Schulman, Paul, 3, 33, 38, 101, 151

- Science* (journal), 43, 98
 scope. *See* knowledge bases/scope
 setback management, 99–105, 140;
 lag and, 104; resilience-with-
 anticipation and, 79, 100–102,
 152–53
 Shiller, Robert, 11, 155n7
 Simon, Herbert, 173n10
 Smetters, Kent, 116
 Smith, Adam, 70, 131
 Soros, George, 27
 standpoints, 62–64, 87
 street-level workers, 39–42, 84, 121
 subsidy policy, 130

 Tavakoli, Janet, 76
 Tawney, R. H., 68
 Taylor-Russell diagram of Type I and
 II errors, 169n4
 Tett, Gillian, 23, 85, 117
 Thatcher, Margaret, 139
 Thompson, Michael, 120–22
 TNO Defense, Security and Safety,
 29–30
 translation skills, 6, 38–39, 47–48,
 51, 132, 154–55, 163n11
 Trichet, Jean-Claude, 169n6
 Turgot, A. R. J., 117

 Unger, Roberto Mangabeira, 139
 unionization, 80–81

 United Nations, 42, 68
 unreliability, 8, 16, 131. *See also*
 reliability
 unstudied conditions, 57; bad messes
 and, 22, 26; of financial crisis, 58–
 59, 85, 100, 152; risk assessment
 vs., 58; use of term, 9, 14
 U.S. Treasury, 93
 utilitarianism, 69

 value pluralism, 138, 153
 volatility: better practices for, 78–79;
 defined, 18–20; liquidity and, 25;
 options and, 19, 21, 25, 119–20,
 122, 125–26; politics of, 119;
 reliability and, 67
 Volcker, Paul, 24
 Voltaire, 64

 Wang Xizhi, 104–5
 Watson, James, 43
 Wildavsky, Aaron, 120–22
 Wilson, Harold, 11
 Wilson, James Q., 119, 122–23
 Wilson, Timothy, 117
 Wolf, Martin, 16, 51

 y2K problem, 13

EMERY ROE

is an associate at the Center for Catastrophic Risk Management, University of California, Berkeley. His publications include *High Reliability Management: Operating on the Edge*, with Paul Schulman; *Taking Complexity Seriously: Policy Analysis, Triangulation, and Sustainable Development*; and *Narrative Policy Analysis: Theory and Practice*.

Library of Congress Cataloging-in-Publication Data
Roe, Emery.

Making the most of mess : reliability and policy in today's management challenges / Emery Roe.

p. cm.

Includes bibliographical references and index.

ISBN 978-0-8223-5307-2 (cloth : alk. paper)

ISBN 978-0-8223-5321-8 (pbk. : alk. paper)

1. Policy sciences—Decision making.

2. Infrastructure (Economics)—Management.

3. Risk management. 4. Reliability (Engineering)

I. Title.

H97.R64 2013

658.4'01—dc23

2012044753

In *Making the Most of Mess*, Emery Roe emphasizes that policy messes cannot be avoided or cleaned up; they need to be managed. He shows how policymakers and other professionals can learn these necessary skills from control operators who manage large critical infrastructures such as water supplies, telecommunications systems, and electricity grids. The ways in which they prevent major accidents and failures offer models for policymakers and other professionals to manage the messes they face.

Throughout, Roe focuses on the global financial mess of 2008 and its ongoing aftermath, showing how mismanagement has allowed it to morph into other national and international messes. More effective management is still possible for this and many other policy messes but that requires better recognition of patterns and formulation of scenarios, as well as the ability to translate pattern and scenario into reliability. Developing networks of professionals who respond to messes is particularly important. Roe describes how these networks enable the avoidance of bad or worse messes, take advantage of opportunities resulting from messes, and address societal and professional challenges. In addition to finance, he draws from a wide range of case material in other policy arenas. Roe demonstrates that knowing how to manage policy messes is the best approach to preventing crises.

"In *Making the Most of Mess*, Emery Roe outlines an analytical scheme that helps us to make sense of today's messes and offers a true alternative to currently fashionable 'all or nothing' solutions. He is a highly creative, often provocative, truly original, and erudite thinker."—**Arjen Boin, Professor of Crisis Management, Utrecht University**

"If only regulators would read this book, instead of talking to each other and the businesses they regulate, we might have a chance of avoiding another major financial meltdown."—**John Kay, columnist for the *Financial Times* and author of *Oblivious: Why Our Goals Are Best Achieved Indirectly***

EMERY ROE is a senior associate with the Center for Catastrophic Risk Management at the University of California, Berkeley. He is the author of *Taking Complexity Seriously: Policy Analysis, Triangulation and Sustainable Development* and *Narrative Policy Analysis: Theory and Practice*, which is also published by Duke University Press; and, with Paul R. Schulman, *High Reliability Management: Operating on the Edge*.

Duke University Press
www.dukeupress.edu

Cover Photo: A control room lab.

D04755340S



Duke University Libraries